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P & Q 4-13-Gray

Pit and Quarry

Published Every Other Wednesday for Producers and Manufacturers of Sand Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

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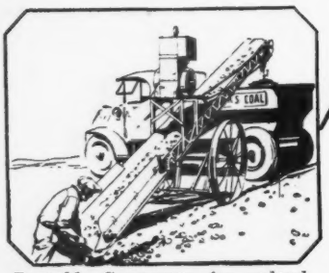

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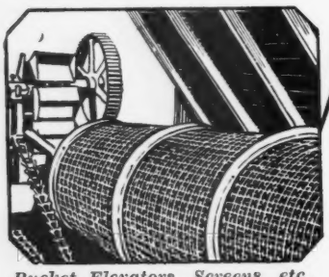

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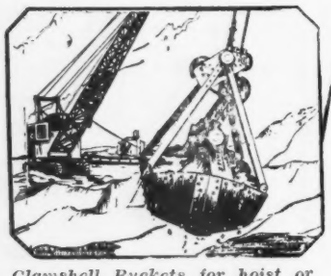

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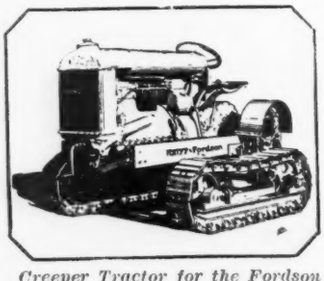

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Pit and Quarry

Vol. 14 CHICAGO, ILL., APRIL 13, 1927 No. 1

COOPERATIVE ADVERTISING A DEFENSIVE NECESSITY

IN addition to the competition between manufacturers and producers in the same line there has recently been recognized the even greater competition existing between different industries for the patronage of the public. To build a house of brick, we cannot also build it of lumber or concrete blocks. When we buy collars or hosiery we cannot also use the same money to take up to the theater. We therefore find, in the common rivalry for the consumer's dollar, that the manufacturers of a certain line are more co-workers forming a united form against extraneous attack, than competitors fighting for business.

Cooperative advertising has been found to be the answer:—a common effort of competitors to improve and enlarge their markets, or to combat a common enemy. Association advertising prepares the background for individual advertising. Whether it be cement, crushed stone, candy, bananas, beverages, or shoes, we will buy the more readily if a seemingly disinterested association tells the advantage of the particular product than an obviously biased single producer. Being thus sold, it is then up to the individual manufacturer to get over his particular brand. To such an extent has this principle taken hold that we have definite knowledge of the success of 48 cooperative advertising campaigns, and the failure of 5 such plans. The latter can, in every case, be attributed to poor planning and misdirection.

It is not too much to say that a situation now exists in which those who do not combine to present their products to the public in a large and effective way, are finding that money ordinarily spent in their field is slipping away. Cooperative, association advertising is rapidly becoming a necessary defensive measure, recognized as such not only by worthy advertisers and publishers, but bankers and business economists. Indeed, only recently, the United Business Service issued a bulletin on this subject.

Few individual advertisers can match the effect of a large scale, wide-spread campaign such as a strong association can put on. If your industry is not already in this field, and if you have anything to put before the public, either as a product or a message, self preservation dictates that you and your competitors get together on this subject without delay.

WOULD A CREDIT ASSOCIATION HELP?

IS there a notable lack of interest in the work to be evident on the part of some of your employees? In many cases, the underlying cause for a worker's lack of interest in his job will be found to be financial worry. Either through lack of systematic thrift, or perhaps through some unfortunate circumstance he finds himself in the clutches of a loan shark. In such a case the individual often has real cause to worry. Tactful investigation into the underlying causes for an evident lack of interest will reveal money matters as the basic reason in a surprisingly large percentage of cases.

The establishment of an individual credit association within your own organization may help eliminate this evil. A dissatisfied, uninterested employee turns out only a fraction of the volume and quality of work that can be produced by an employee only equally efficient but who is keenly alive to his job and enjoying domestic happiness. Thus it is tactful investigation and carefully planned steps for correction often yield exceptional dividends.

If the establishment of a credit association among employees is planned, it will be seen that the underlying purposes will be: 1—to promote systematic thrift among its members; 2—to enable them to obtain loans at no more, and frequently less, than the current legal rate; and 3—to educate them in the management and control of money and securities.

Funds are accumulated by the sale of shares in the association, which shares are usually put at $5.00 par. Since a credit association aims to help those who are least able to help themselves, payments for share subscriptions should be allowed on the installment plan, even to sums as low as ten or twenty-five cents a week. Stress should be put upon the regularity of payment rather than upon the amount paid. Additional funds are secured by deposits, likewise very small, through members of the Association. The success of a credit organiza-

tion depends largely upon the habit of saving or the regularity of operation, which it creates and develops among its members.

Money thus accumulated is used in making provident loans to members exclusively. The loans are repayable on a weekly basis, and are generally short-term. No officer of such an association should be able to borrow from the funds he audits or controls, and he should not have the power to endorse the loans for other borrowers, except on the special permission of the loan committee. Each member of an association of this sort has one vote, regardless of how much stock held, or the amount of deposits to his credit. Membership is of course restricted to organization employees.

A new member, owning but one share of stock is required to subscribe to a proportional part of a loan granted him in shares, and this he pays for as he repays the loan. Preference is given to small loans; and a statement of the purpose of the loan must be set forth in the application for it. A man's character and standing among his fellows and with the management (which of a necessity largely influences the operation of a credit association) are first considerations in granting a loan.

The officers of a credit association should be authorized to invest surplus funds in good securities. Although the first principle is service, it is possible by good management, to pay dividends on paid-up shares. These, however, are invariably small.

Shares are kept at a constant par value in order to create a surplus to serve as a source for credit when the association itself needs to borrow, or for emergency demands. Interest is paid upon deposits. A guaranty fund, not to be distributed except in case of liquidation, is established, composed of a percentage of the net earnings. This is also used to offset bad loans.

The absence of paternalism makes the credit association adaptable to all types of employees, and under proper managerial guidance, can be made to exert a powerful influence in educating employees along sound economic lines. Successful operation of such an association will contribute heavily to decreased labor-turnover and increased production.

THROWING GOOD MACHINERY AWAY

ONE of the principal reasons why the United States is so far in the forefront of all other nations in the matter of production and wealth is because we have been perfectly willing to throw good machinery on to the junk pile. Not that industrialists find particular pleasure in junking expensive and quite efficient machinery, but in general they have come to realize the value of increased efficiency, with the result that regardless of how good may be a piece of equipment or how efficient some particular practice, that equipment or practice is abandoned just the moment a still more efficient medium has been found. This ready acceptance of the new and better very largely accounts for our exceptional industrial progress.

The flail would doubtless be as efficient in threshing the wheat grown today as the wheat of one hundred years ago. The sickle and the scythe still cut with the same degree of efficiency and speed, but no 1926 farmer could eke out an existence with these obsolete implements because all other farmers have progressed to the six-foot mower and the power thresher. The lathe that turned out the machinery parts twenty years ago could just as well turn out the same parts today and probably continue to do so for another twenty years, but the operator could not hope to successfully compete with the machine shops equipped 1926 lathes. Probably the mangle of five years ago would iron flat work as speedily and efficiently today as when it was first installed, but in comparison with the amount and quality of work turned out by later mangles, it is a most expensive machine. The old horse and buggy will go as far and as fast today as it would thirty years ago, but no sales-manager of today would think of choosing the horse-drawn phaeton in preference to the automobile for his road men.

During the past ten or fifteen years we have heard it said "they don't make things as well nowa-days as they did fifty years ago." In isolated cases such statements may be true but it is our opinion that for American products in general it is absolutely unfounded. Producing things at high speed on a large volume does not necessarily indicate that there has been a sacrifice in quality. We can point to scores of products that are of far higher quality than when first produced—and which are being sold at a much lower price. The increase in quality and the decrease in cost have been made possible by the willingness of the manufacturer to discard machinery before it was worn out—to replace otherwise good machinery and methods with equipment that was better.

3. OLD MAN EXPERIENCE SAYS

The ability to distinguish between petty details and the things that really count frequently determines the difference between failure and success. The fellow who "gets there" does not become buried with trifles nor does he lose his sense of proportion.

DISTINCTIVE LIME PLANT TUCKED AWAY IN THE BERKSHIRE HILLS

By F. A. Westbrook

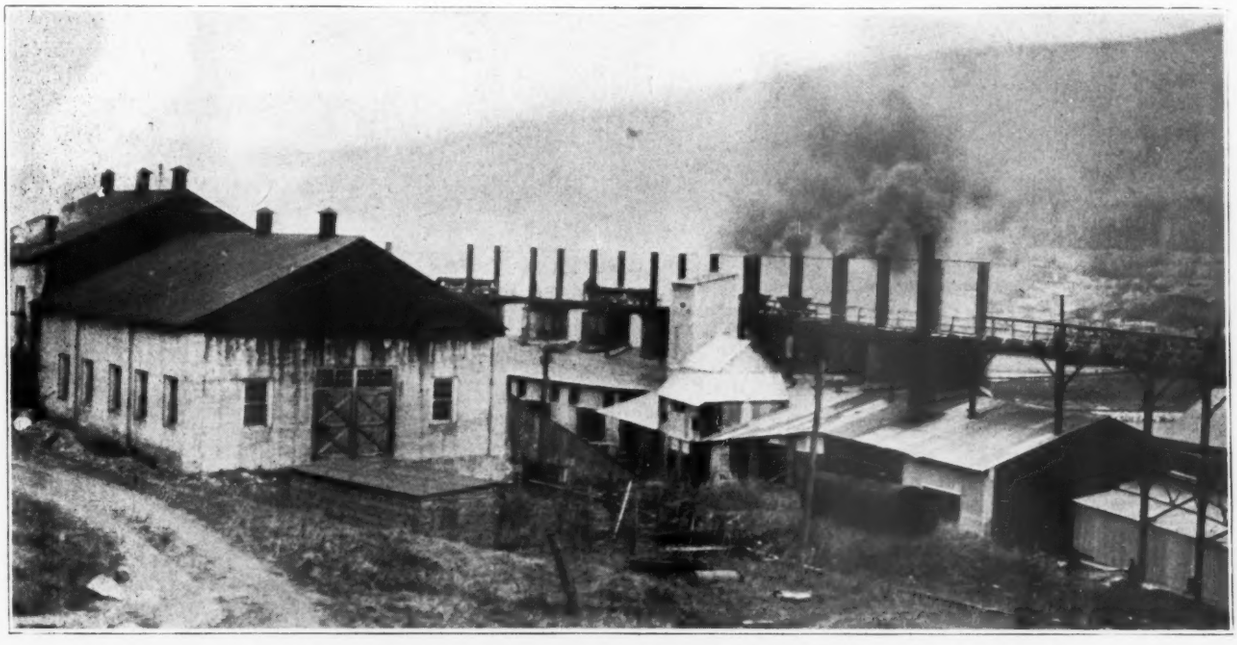
MOTOR travelers passing through the fine hill country traversed by the highway between Pittsfield and Adams, Massachusetts, are sure to have their attention arrested by a large industrial plant rather picturesquely situated on the opposite side of a lake near the small town of Farnam. That is, his attention will be attracted if he is interested in manufacturing operations and he will quite likely be interested to know what processes are being performed at this plant. In some ways there is something suggestive of blast furnaces in the general appearance of the building but nearly everybody knows that blast furnaces are now past history in this section. Of course a great deal of lime is burned in the Berkshire Hills country but there is nothing at this plant resembling orthodox lime kilns and besides there is no quarry anywhere in sight. However, this is the plant of the Farnam-Cheshire Lime Company which has the distinction of shipping more barreled finished lime than any other plant in this country. It has 21 kilns of unusual design and the production is 250 tons of lime per day. The reason why the quarry is invisible is because it is in the valley on the other side of a range of mountains and is reached through a tunnel nearly half a mile in length.

The original quarry has been worked for 20 years. It is about 100 feet deep and the bottom covers several acres. The only means of getting into it, except scaling the sides with the help of a rope, is through the tunnel from the other side of the mountain. The track at the quarry end of the tunnel fans out into a number of approaches to the working face of the quarry.

Views of Locomotive and Dump Cars

There is one very advantageous operating con-

Track at Side of Kiln House Where Coal and Wood are Delivered



Group of 15 Kilns Including Gas and Coal Burners

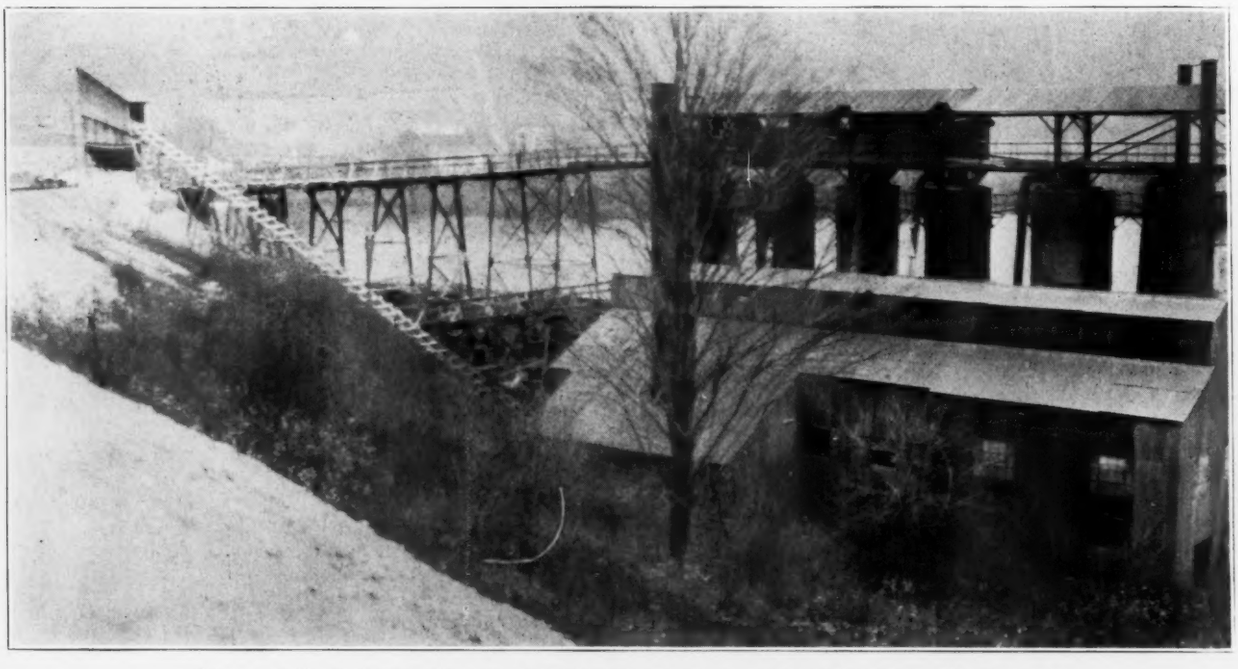
494164

Stripping to Extend Surface of the Old Quarry

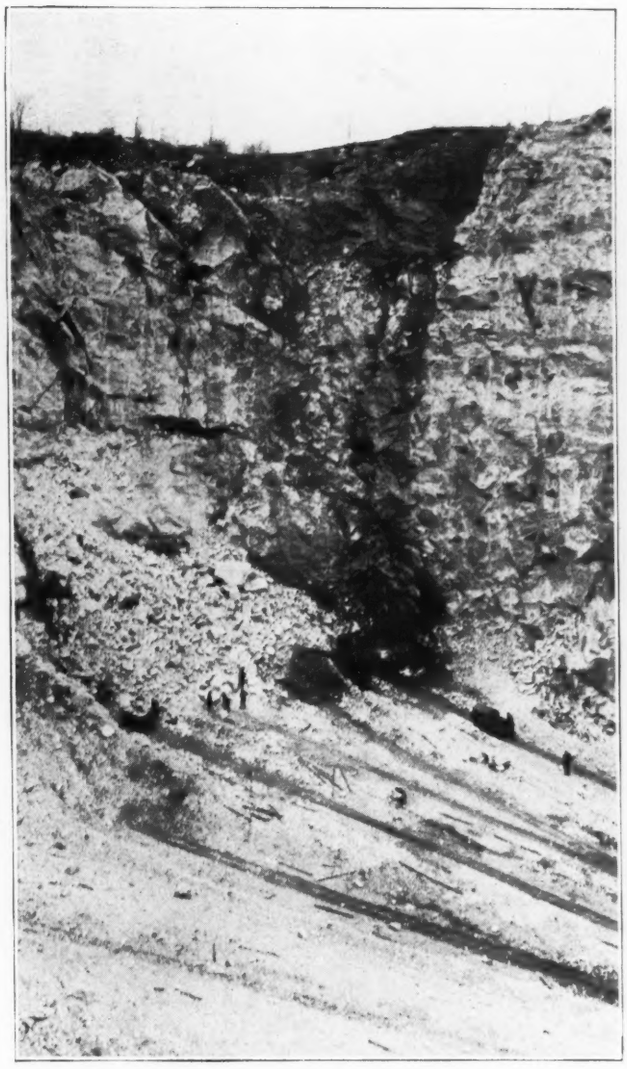
Coal Conveyor to Power House at Right

dition in this quarry, namely, that the tracks through the tunnel have a down grade to the burning plant, which is about one mile away. It is thus possible for the trains of loaded cars, each holding 2½ tons of stone, to coast down to the plant. Whitcomb gasoline locomotives, of which four are in use, are used to make up the trains in the quarry and also hold them back on the trip to the kilns. Each locomotive is capable of hauling back seventeen empty cars from the plant to the quarry.

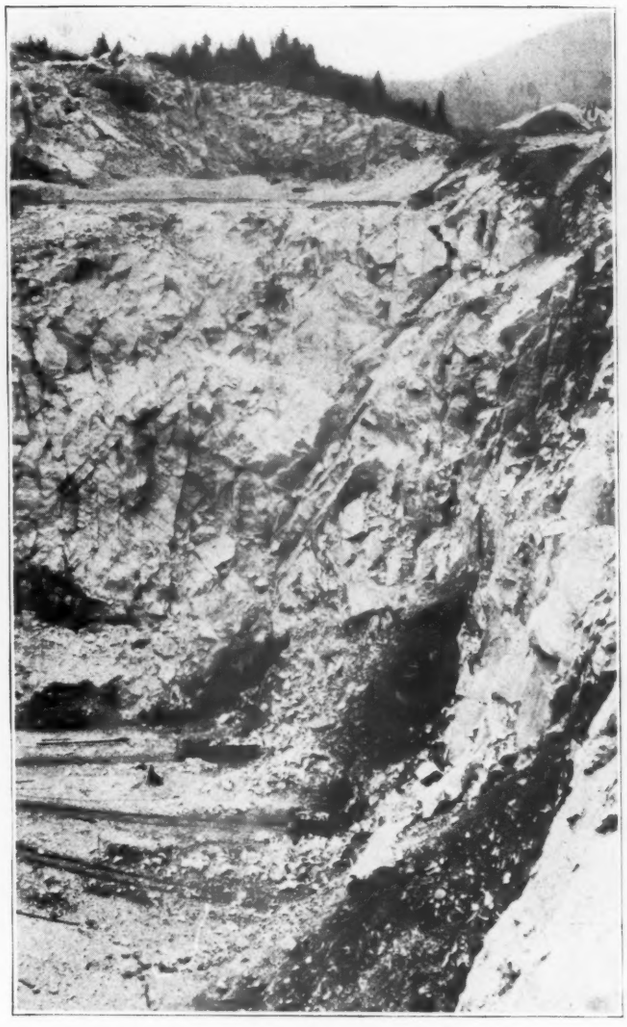
Blasting is done by means of 30 per cent DuPont dynamite and Ingersoll Rand jack hammers and X-70 drills are used for drilling. The holes are made 6 feet apart, 10 feet back from the bottom of the



Group of Six Kilns Burning Gas Showing Trestle for Charging Direct from Quarry Cars

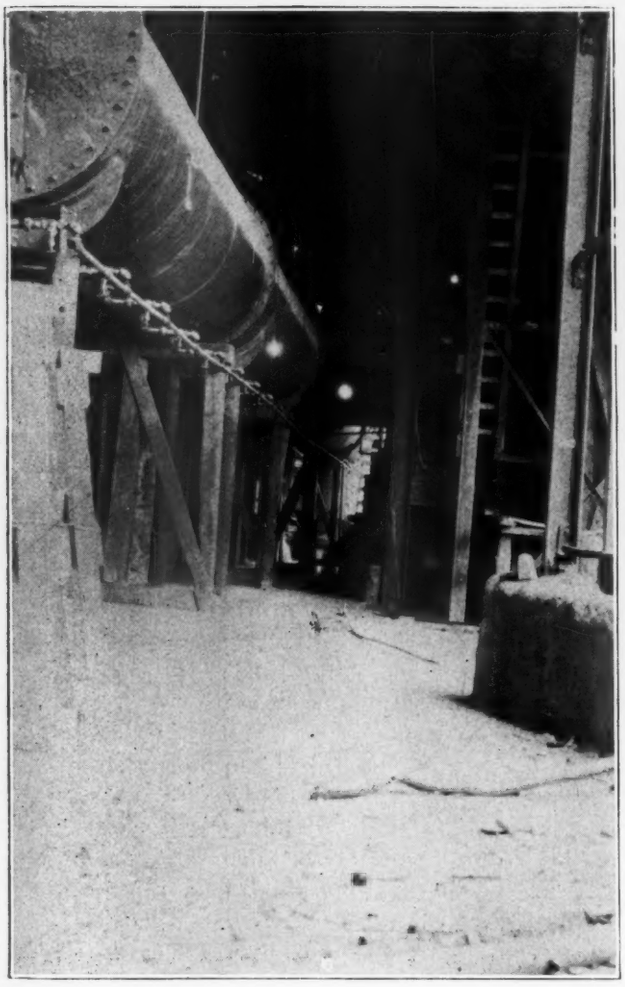


Working Face of the Old Quarry



Working Face with New Quarry in Background

Tunnel Openings in Old Quarry



Firing Floor of the Gas Burners

Firing Floor of Some of the Coal and Wood Burning Kilns

face and are usually 40 to 50 feet deep. Approximately twenty holes are fired at one shot. At the present time the opening of the old quarry is being extended and the ground is being stripped by a Thew gasoline crawler shovel. The plant has also a newer quarry which is reached by a tunnel from the old one. The stripping operation, just mentioned, is a preliminary to joining the two quarries. When the stone has been brought by the locomotives it is dumped into the tops of the kilns direct from the quarry cars.

The plant has two groups of kilns, one of fifteen and the other of six. Of the larger group nine burn coal and wood, and six gas or coal and wood. A Morgan gas producer, with a capacity of 30 tons of coal per day, is used to supply gas to the kilns. The method of handling coal at the kilns reduces the manual labor to a minimum and is as follows: The gondola coal cars are run on a siding, adjacent to the firing side of the kiln house, and dumped into a pit; from here the coal is taken in a conveyor to the firing floor and a second conveyor, extending in the opposite direction, takes the coal up to the power house, which is situated a short distance up the hill.

The building housing the kilns is made of substantial steel construction and the lime drawing floor is kept in a very neat condition. With this in mind empty barrels are stacked at each kiln and as they are filled are moved back toward the doors, on the other side of the long room, from where they are loaded onto freight cars. The building is provided with two sidings, one on each side of the kiln building, one being used for bringing in coal and wood and the other for taking away the finished product. The cooperage shop, owned by the International Cooperage Company, is on the drawing floor level and at one end of the kiln house.

The group of six kilns is located a short distance from the group of fifteen just described and are all operated by gas. Four of these are Mount kilns and the other two were designed by the Company's own engineers. All these six kilns are supplied with gas from the two 10 ton Morgan gas producers.

Power to operate the plant is generated in the Company's own power house by means of two Dillon horizontal return tube boilers and two Fitchburg Engine Company single cylinder engines. One engine drives a 200 k.v.a. and the other a 192 k.v.a., 440 volt, 60 cycle General Electric Company generator. Compressed air to operate the drills at the quarry and for other purposes around the plant is provided by two type 10 Ingersoll-Rand

Lime Drawing Floor. Note Extreme Neatness

Imperial compressors. One of these is driven by a 38 horse power General Electric induction motor and the other by a synchronous motor, the second type being useful in keeping up the power factor.

A shop has also been provided where repair work and less complicated kinds of construction are carried on. An Ingersoll-Rand drill sharpener and Fairbanks bolt threader are a part of the equipment. This company owns a large tract of land including all the property which lies between the kilns and the quarry. In addition to the plant described there are several workmen's cottages and a very attractive office building.

This plant is unique in both its location and also the manner in which the lime is conveyed from the deposit to the kilns. A visit to the plant is one of those interesting experiences as the visitor meets so many things which he did not expect.

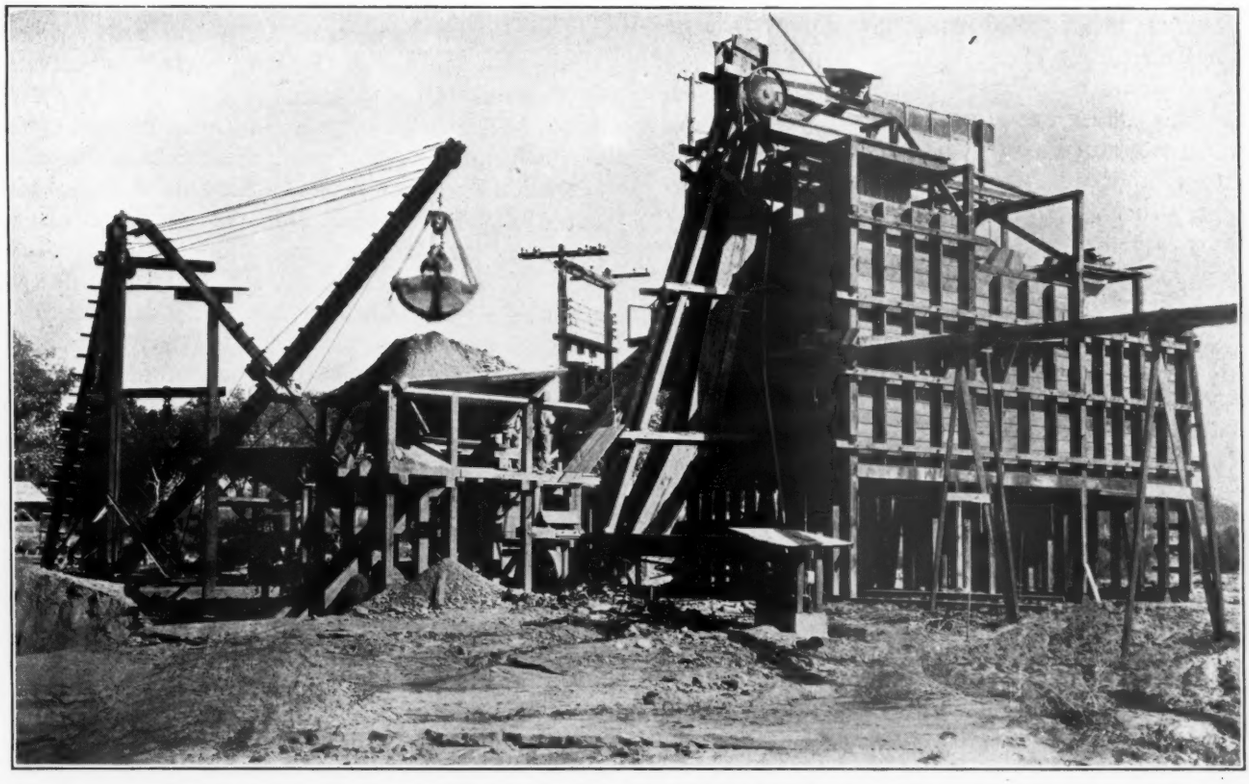
A Record for this Type of Plant

A record of 34,000 yards in the first 90 days' operation, almost 40 yards an hour, is the clean-up of sand and gravel and crushed rock taken out and delivered by the Arizona Rock and Sand Company, of Phoenix, Arizona. The demand has been steady from the first day of operation, and the outlook is good for a prolonged building campaign in the Salt River valley.

"We have been agreeably surprised by our first quarter's business," said D. W. Kelley, president, "and we feel now that we are well established and will continue to grow. We have 30 acres of river bottom and we expect to work to a depth of fifty feet."

Inspection of the plant reveals a neat layout with the latest type equipment installed complete and operating at full capacity. Electric power from the Roosevelt dam is used, and a Sauerman drag line operating in a 200 foot radius brings in a good quality of mixed sand and gravel to the screens and crushers. Trucking is contracted at 50 cents a yard for city delivery, and for the most part the owners are the drivers. The roads to the plant are paved and most of the city of Phoenix is easily accessible, no hills being encountered and few unpaved streets.

J. H. Perkins, vice president and production manager, has organized the business with a view to increased production for the future and an increasing business extending over a long period. Experienced men have been employed in every department and contractors are congratulating the new firm on the start they have made.



Arizona Rock and Sand Company's Plant

BLACK BASE
ITS PLACE IN STANDARD SPECIFICATIONS

By Hugh W. Skidmore

President, Chicago Paving Laboratory*

BLACK BASE has acquired widespread recognition as a standard type of pavement by reason of its long service. There has been very little experimentation connected with the development of this type of foundation, especially for use under all types of asphaltic surfacing. Frequently reference is made to a very old piece of Black Base that has been opened for some reason or other, and invariably it will be found that its condition is excellent, showing no bad results from contact with earth moisture, frost and similar destructive elements. In 1923 California had over 2,000,000 square yards of Black Base pavement over ten years old. The City of Denver has been building Black Base on an average of half a million square yards per year during the past few seasons. Likewise, in the South and some of the South Western states, there is considerable yardage including numerous projects with lime rock asphalt surfaces and also many examples of the same type of asphalt employed in the base. The State Highway Department of Michigan during the past three constructive seasons, has been engaged in an extensive program of Black Base stone filled sheet asphalt paving over old graveled highways. The City of Grand Rapids is laying from 50,000 to 100,000 square yards per year employing a 4½ inch Black Base with 1½ inch top.

In Passaic and Paterson, New Jersey, are to be found numerous examples of this pavement from 3 to 5 years old. These roads were made with a 7½ inch Black Base and 1½ inch sheet top. All of the work in Passaic and some of that in Paterson has followed this plan as to total depth of pavement. In Paterson one section was laid in 1923 using 4 inch Black Base and 2 inches of topping, while another section was laid with a 5 inch base and 3 inch top.

The usual construction for pavements in Trenton, New Jersey, is 6 inch of base laid in two courses of regular binder composition with regulation sheet asphaltic top. These pavements are on heavy traffic arteries either within the city of Trenton or immediately adjacent thereto. Two years ago, the Richmond-Seven Pines Road was built with a pavement which consisted of 4 inch of base and 1½ inch of sheet asphalt top. It would be difficult to imagine any pavement being built under any more adverse conditions. The soil is yellow clay which retains its moisture for extremely long periods. There is practically no side drainage away from the pavement and, in addition, it rained almost constantly during the early part of the construction work. However, despite this poor start, the work looks good.

Much of the Black base has been laid directly upon the native subgrade, while some such as Beachwood Blvd., was laid over old roadways and hence varies in depth from 4 to 7 inches. In some cases such as Smithfield and Diamond Streets (on earth subgrade) which carry extremely dense, heavy traffic, the base was laid 10 to 12 inches thick. Mr. Strain is justly proud of the fact that the entire block in front of the P & L E Station on Smithfield Street was completed, including excavation, base and top, during the working hours on a certain Sunday in 1921. Again we see the time element a very important factor. Such a feat could not have been accomplished by any other form of construction.

During 1924 and 1925 about 100,000 square yards of 4½ inch Black Base with 1½ inch sheet top was laid on native clay and loam subgrade in Quincy, Illinois. The base mixture on this work was extremely dense, by virtue of using a well graded crushed rock coarse aggregate, from 2½ inch down, in size. In every instance this base was laid in one course directly upon the natural subgrade and in some cases the nature of the soil made construction difficult in wet weather.

During the same year, 1923, the Brush College Road, just outside of the City of Decatur, Illinois, was paved with 1½ inch sheet on 5½ inch Black Base. Since this project has been previously described in detail, only mention is made now, calling attention to photographs taken this summer after three years of service. Not a single defect of even the most trivial nature can be found. Notwithstanding the fact that at least one well known highway engineer said at the time that this experiment on Illinois black soil would fail, the pavement bears every possible evidence of a long and economical service period ahead. Indeed, observation of this particular piece of road has lead the Decatur Park Board to select Black Base for paving the Park drives.

Frequent reference has been made to Black Base laid in Washington, D. C. about half a century ago and still in service. Omaha, Nebraska laid 4½ inch Black Base with 1½ inch top in the years between 1889 and 1893 to the amount of more than 100,000 square yards. In 1924 these pavements were still in highly serviceable condition, only 2,134 square yards having received a new top during a life of 31 to 35 years.

Abstracted from a paper presented before the Fifth Annual Asphalt Paving Conference at Washington, November 8-12, 1926.

SALESMEN AND SALES

CONCERNING PARTICULARLY THE CRUSHED STONE INDUSTRY

By R. N. Van Winkle

SALESMANSHIP is generally considered to be something vague, mysterious, inspiring. Salesmanship, as some one has aptly said, is 90 per cent honest to God hard work and 10 per cent ability, or, that its a good deal like fishing: 90 per cent in knowing where to go and 10 per cent in going there. In other words, you must know where to get business and work hard to get it. These of course are not all the requirements necessary to sell crushed stone for it must be kept in mind that all prospects are not potential customers for crushed stone as they are for life insurance, automobiles, electric sweepers, etc. Therefore a salesman in our business cannot follow, as a rule, prescribed methods that are used in other general lines of selling.

It is almost an impossible thing to definitely instruct any man, who has had no experience in the business how to go out and sell crushed stone so the best man any company can possibly hire for a salesman is the one who has had experience in some branch of the industry and is entitled by his efforts and work to advancement. Absolutely nine times out of ten the best men in your organization whether salesmen, foreman, mechanics or what not are the men you have made yourself, promoted and developed right within your own organization and the writer believe this goes for salesman as well.

As to the qualifications of a man to be a salesman. After having gained the necessary general knowledge of the product he is going to sell the next most important thing as the writer sees it, is that the man has personality. A pleasing personality, a friendly state of mind and the gift or ability to inspire confidence. Quite often one hears a great deal about the six footer, the athletic man being the most successful as a salesman. As for the writer part, size of personality means more than size of stature. Now personality is really what? The definition of personality is, "That which constitutes distinction of person; distinctive personal character; individuality." Personality implies complex being or character having distinctive and persistent traits, among which, reason, self-consciousness, and self-activity are usually reckoned as essentials. Well, maybe the definition is right but as far as a salesman is concerned it is that something, ability, we will call it, to overcome resistance to buying. This resistance to buying whether we appreciate it or not is in all of us, we assume unconsciously or otherwise that "Show me" attitude in practically all our purchases. It is this resistance that a good salesman overcomes.

It is to be regretted but there are no rules of law or rules of conduct as far as the writer knows governing the pricing or selecting of salesmen. In our industry about all any executive can do is to do his best, using every facility at his command to select the right sort of a man to represent his company. If a man has a general knowledge of the industry, has personality, the willingness to work, is honest and has a fair amount of ability the writer would take a chance on him. This man should be coached and supervised continually, at first, and the proper sort of an executive will as a rule give a man this attention and even more to make him a success rather than admit to himself that as an executive he is a poor judge of human nature and picker of men. Changing salesmen is poor policy, therefore, when a man is hired no end of time or trouble should be gone to to make that man make good and produce. If, on the other hand, your judgment has been bad and the man is found not suited or not qualified, waste no time in discharging him as you will only be kidding yourself and doing him an injustice to keep him. You as well as the salesman must come to realize that he is the direct representative of your company, that his actions, statements and policies at all times are taken by your customers as representing the actions, statements and policies of the firm or company he sells for and above all your firm must not be misrepresented.

To the writer's mind the best medium of selling crushed stone is by personal contact and that more sales are made today based on personal or company friendship than any other single thing. The salesman today who has the ability to get on friendly business terms with contractors, engineers, commissioners, officials and in fact all of his trade is as a rule the man who gets the orders for crushed stone, even though things break against him as to price, etc. Personal contact is merely a matter of systematic calling on customers and getting on friendly business terms with them. It may take weeks, months, or a year but personal service and personal favors are often conducive to friendly relations between salesman and customer. Remember too, molasses catches more flies than vinegar and that courtesy and praise go a long ways as all of us are a trifle vain and welcome praise even if we say we do not. Friendship can be fostered in numerous other ways. Take time to visit and talk to your customer, provided you hit him in a talkative mood, listen to his troubles, personal and business and be sympathetic, but leave your troubles at home. If by chance he is not in the mood to talk, make your stay short, business like and go on, otherwise you are wasting your

time and his too. So being on friendly terms and having personal contact with your customers are as the writer sees it the two important things in selling, and crushed stone in particular.

Personal contact or friendship with customers is not always quickly made, therefore, time is a factor to be considered in selling. Rome was not made in a day, so it is said, salesmen are neither made in a day. It often happens that just the man or firm you most desire to sell is the one you cannot connect with. Real persistancy and quite often being a good loser while abiding your chances are the qualifications that win out in the end.

To go back a minute to where the writer referred to time as a factor to be considered in selling. Time is a factor but it need not be wasted. Thomas Edison says: "Time is really the only capital that any human being has, and the one thing he can't afford to waste." It is not necessary for a stone salesman to waste time for while he is primarily called a salesman he must of necessity, if to be successful, be a promoter, too. Quite often the actual selling of crushed stone, is nothing more or less than order taking, as the smart salesman has previously promoted the work, by showing a necessity for the particular improvement and has been such a good promoter that getting the order signed up is merely incidental. Promotional work, creating a desire for improvements, roads, streets, bridges and repairs are a part of selling stone. Time therefore should not hang heavy on any stone salesman's hands, nor should it be wasted as promotion offers an unlimited field for activities. There is still another way of making use of a salesman's spare time, for a good salesman is always busy, after calling on old customers, seeking new ones. It stands to reason and the salesman should know, that any company of necessity must lose old customers and that new connections, new customers must be constantly made, otherwise sales will decline and business be poor.

This brings to the writer's mind, though it may be out of place, the quite often argued question of whether a salesman should be used as a collector. For the writer's part a man cannot successfully be a Dr. Jekyll and Mr. Hyde and that is about what is asked of a salesman when you make a collector of poor or bad accounts out of him. It's fair enough to ask him to bring up the subject of a past due account with one of his customers but to send him out into his own territory as a collector the writer believes is wrong. If any bad feelings are to be created or misunderstandings had, between customers and the company, keep the salesman out of it and let it be handled by some one of authority in the head office, thereby not sacrificing the salesman's friendship or personal contact with the customer. If he is a good salesman he will not sacrifice it if he is not involved and the matter is handled by headquarters direct. Whether or not the salesman is called upon to be a collector, the salesman in taking orders, should always feel the responsibility for the payment of the material furnished on the order and not take orders just for the pleasure of selling and for making a sales record.

The selling of crushed stone as far as the writer knows from his limited experience, offers no possibilities for the so-called high pressure salesman. The high pressure variety is as a rule the one time variety, too. He, as a general thing, calls once and sells once, but does not wear well with customers so repeat orders rarely follow. Repeat orders are a necessity in the crushed stone business as market territory is limited on account of freight rates, so a high pressure one time salesman who does not wear well and improve on close acquaintances is a poor representative for a company engaged in our industry.

In a very recent article published in this magazine dealing with budgets and budget systems as applying to this industry, the writer made reference to salesmen and executives living beyond their positions in an endeavor to keep up with, or out do their fellows. There is another angle too, to this extravagant spending which applies to all representatives, sales and otherwise of an organization. It is doubtless just human nature for all of us Americans to want to make an impression or show, we will call it, in one way or another. That's all very well and fine if we are prosperous and have the wherewithal to keep it up. On the other hand the reckless and lavish spending and quite often wasting of money does not give or leave the impression of good sound business, but tends to give the customer or buyer the impression your profits are in excess of what they really should be. You leave with him the idea there are barrels of money made in your business and that he is helping make it for you by paying too much for your commodity. This is an angle for the salesman worthy of consideration especially in our line as profits are surely not big enough to create any such impressions.

A salesman, to make a success of selling stone, must first be convinced in his own mind that crushed stone, the product he is selling is the best material on the market for the particular work for which he is selling or offering it. Unless a salesman can honestly feel this and believe that crushed stone is superior to other competitive materials he is not sold on the product he is going to sell and consequently he will not be successful in selling it. Belief in your own product is the basis of salesmenship. One will doubtless encounter many arguments for and against stone in selling work. As a rule salesmen should avoid these arguments, especially with engineers, officials and customers but do not under any circumstances back down or take to cover if an argument is thrust upon you and unavailable. Remember then to keep a cool head and stand your ground in a gentlemanly way as you are the representative of a re-

spectable company selling a standard and basic product and if you conduct yourself properly no one can take offense. Always defend yourself and your company's rights. Even boost your own product but make it an unwritten law not to knock your competitor's product.

There was never a time in our industry that service is as much appreciated, maybe not appreciated as it is demanded, as it is today. When it is a question between price and service the salesman who can promise service and deliver it will win out. Be careful not to promise the impossible but by close application services can be pretty well assured to the customer provided his demands are in reason and as a rule they are.

The salesman who can talk the things aside from his own line that the buyer or customer is interested in goes a long ways in establishing friendship and confidence. Learn to talk his language, so to speak, as readily as possible and talk it to him where the proper occasion offers itself whether it be pigs, baseball, or flowers. Just remember all your customers are plain humans after all and its up to you to find that human side of them. It is there if you can find it.

Ample opportunity has been given the writer to sit on the opposite side of the table from the salesman, acting in the capacity of customer or buyer. I have been the buyer of most everything used in and around a quarry so it is only natural that impressions should be made on any mind of mistakes made by salesmen in other lines which are directly applicable to salesmen in our particular line. For instance a salesman should not tell a customer too much at one time or meeting. It only tends to confuse him and he is apt to lose interest in your whole proposition. By all means don't rush in blindly to sell anyone, thinking you are going to sweep them off their feet and that an interview is the whole works. Have some well thought out scheme or systematic plan of approach or attack or you will find yourself in deep water. In this great democratic country of ours there can be no caste or class distinction to put yourself in, and so consider yourself on a business level of your customer. Do not attempt to "high hat" him or let him "high hat" you. Quite often a salesman gets to thinking salesmanship is "Time plus monotony" and when he does he is a bore. Decision, desire and vision are necessary attributes of a successful, interesting salesman. Neither should a man be one of those "Have a cigar" salesman we so often encounter who about the first thing he does is offer you a cigar. Always attempt to inform yourself in so far as possible of your customers problems. That is a great aid in selling and also in helping him. Talk logically and do not scatter and jump from one subject to another if you hope to hold your buyers attention. A salesman of the right type is a real fountain of information regarding the activities in the buyer's industry and other industries as well. It is a good idea to give this information if it is asked for but in doing so do not betray confidences placed in you or create friction and bad feelings among competitors. Above all, leave employees of competiting companies alone and do not attempt to place them in new or better positions in competitive lines as it generally works out all wrong and you are to blame. Make it a rule not to talk to employees without first obtaining permission from proper authority. Remember they are there to work and you should be too.

Up to this point this article has been devoted to salesmen and if the writer has given any new thoughts or inspired in the reader's mind any new ideas he is amply repaid for his time and effort. The latter part of the subject of Salesman and Sales, namely Sales, is a question of vital importance to the writer even though he be an operator as operators are directly dependent upon sales and it is a phase or angle of our business which needs by far more attention than it is now receiving.

We quarry men as a whole attend meetings and conventions quite regularly where discussions are carried out at some length in reference to types of highway construction, sizing of stone, traffic regulations, safety in quarries, testing of stone etc., but the writer is going to be so outspoken as to say sales, the question of selling prices, selling costs, production tonnages and kindred subjects are the things executives and owners in our industry should be more concerned with. Please do not get me wrong as I approve of discussions on types of highways, sizing, safety, tests etc., but I also approve of, and moreover, advocate putting more stress on the discussion of sales, selling costs, production tonnages and like matters.

Doubtless we all know and appreciate competition is the life of business but it sometimes appears to the writer after years in the industry that even competition can be of a neighborly sort instead of the absolutely cold variety we so often encounter in the stone business. It seems at times we are tied by the bondage of competition rather than fair play and playing fair. Admitting that it may not appear in every locality and district, the writer feels perfectly safe in saying that in the majority of localities and districts competition is the one thing that is throttling the industry the most. As proof of this we will take as an example a few questions covering items of importance to our business.

Why don't we get better prices in keeping with other commodities as the price of stone is by far too low? Why don't we get seasonable prices for crushed stone as it unquestionably costs more to produce in winter than summer? Why don't we stand by the prices we quote and refuse to cut as cutting prices loses us real money? Why don't we refuse to quote or sell questionable or poor pay

customers, thereby stopping litigation, law suits and the spending of additional money? Why don't we collect our accounts when due and stay out of what might be termed the installment business?

These and many similar questions could be asked the quarryman and his answer to all of them would be: Competition is too keen and if we did these things we would have no business. That is exactly what the writer means when he said, it seems at times we are tied by the bondage of competition.

Just what the cause of this competition really is it is hard to say but the writer will venture one cause, namely, envy and jealousy. Possibly these are not just the correct words but quarrymen as a whole are too ready and willing to listen and to believe rumors, especially if disparaging, regarding their competitors. Ungrounded rumors in our industry are the direct cause of many price wars and much unnecessary price cutting at times. How much better off many of us would be if we could but take these rumors we hear regarding our competitors in a sporting spirit, not as facts which immediately reminds one of the story of the boy who whistled in school. In this story the teacher told him to stay after school for whistling in class. After school she asked him why he whistled and he inquired if she saw him. Her reply was that she could not really say she saw him but she heard him whistle, to which the boy made answer, "Well teacher, don't believe everything you hear and only about half you see."

That would make a pretty good slogan as far as competitors in our industry are concerned and if lived up to would no doubt tend to eliminate envy and jealousy and ungrounded rumors. Stop to realize a minute that your competitor has as much real right in business as you have. He has so many things in common with you. First, he has his investment the same as you have. He has his trials and troubles the same as you have. So instead of creating friction and bad blood by spreading rumors regarding each other why not listen directly to one another and show a willingness to learn and cooperate. It is an impossibility to cooperate and help a competitor effectively unless we thoroughly understand him and his plans. If we continue to work in the dark and isolate ourselves from one another we will do harm, instead of good. Frankness helps in all business relations. Where there is no secrecy and nothing is concealed, it should be easy to understand and cooperate.

There is no question of doubt in the average quarryman's mind that we have all sowed our dollars in the business. But are we reaping the return the investments should yield? Personally I question it. The late J. P. Morgan declared that the day was coming when business would have glass pockets. By this he meant that everything would be conducted openly, not secretly. That to the writer's way of thinking is just what the quarry industry needs, a few glass pockets. Glass pockets in the selling end of our industry, a more open selling policy and not so much secrecy between competitors. By their secret policy of selling quarrymen are quite often the prey of unscrupulous contractors and other buyers, who also resort to rumors and untruths to create friction among competitors with the sole idea of obtaining better prices. Who now really suffers by this? Surely not the contractor or buyer, but the quarryman.

The wheels of progress advance with fellowship and cooperate in a common cause—the more difficult the task the closer must be the fellowship and the cooperation. Our common cause is to improve conditions in our business and two of our common enemies especially in our sales departments are—low selling price and bad or slow accounts.

Here we are real men engaged in a ligitimate business, have a basic product for sale, and have large capital investments. Surely we are not in business to wear out machinery, trade dollars and use up our stone deposits. Therefore if we are all agreed on those points let us further agree not to be divided against ourselves but cooperate to graduate our industry from the infant grade to the big industry class where we rightfully belong. Let us further agree to try and give our competitors a truer understanding of ourselves and motives, try to stabilize selling prices commensurably with investments and costs of production for regardless of how big a tonnage you are able to produce, regardless of how low your operating costs may be, returns and prosperity are not forthcoming without proper and adequate marketing prices.

Price cutting has become almost a habit in our industry, it is an epidemic and seemingly highly contageous. It benefits most every one except the quarry owner and operator. In all successful businesses, opportunities are foreseen and plans made to utilize their full effectiveness. In our particular business cooperation in a general way and less secrecy in selling are opportunities open to many of us and if advantage was taken of these opportunities the effects would be far reaching and highly profitable. It is a well known and conceded fact that people work together better when they understand each other. Frankness it seems is the way to thorough understanding. Concealed things are apt to crop out at some very inconvenient time and to do serious damage while a frank discussion of mutual problems paves the way to success.

The reader may think my ideas are revolutionary as far as the crushed stone industry is concerned. They possibly would be in some localities and districts but nothing is being recommended or advocated that has not been previously tried out and found successful in other lines of industry as far as sales are concerned. It is all well and fine to talk about the future but our problems in the sales end of our business are problems of today not problems of the future and our industry as a whole is on the morning side of prosperity if we only but knew

it and would take advantage of some of the ideas of cooperation and frankness, eliminating petty jealousy and envy as other industry has done as between competitors.

In closing this article the writer wishes to take advantage of the opportunity of again calling your attention to the fact that great changes have occurred and are still occuring in modern business and modern business relations which directly affect our industry. If our industry as a whole and our individual enterprises are to succeed and keep abreast of the times we must adopt and adapt ourselves to these changes.

Some years ago all sales of any commodity were made for gain while all buying was considered loss. By this is really meant, when anything was sold it was sold only on the basis of direct gain to the seller. However, when anything was purchased it was as a rule considered as a direct loss to the buyer as it called for an expenditure or outlay of money which was a loss. Today, however, under modern business practices, this has changed, as both seller and buyer must benefit, have profit and be satisfied. The seller must have what the buyer wants at a price that looks attractive and still at a price which gives the seller a legitimate profit, then both parties benefit, have profit and are satisfied. That is modern business today which is really service, not charity.

The old idea of competition was nothing more or less than antagonism. Time has shown conclusively this idea was false. There was a time when men engaged in similar businesses thought it bad practice to belong to the same lodges, the same clubs or the same organizations. They were competitors, therefore must be enemies, antagonistic, towards each other. Today if we are to succeed it is imperative that men who are engaged in similar businesses should belong to the same clubs and the same organizations, work in harmony and exploit every possibility of their business. Our competitors today are not the men engaged in the same business selling or marketing the same product or commodity. Our competitors today are all the organized industries who are competing for the buyer's dollar and in our particular case it is the gravel man, the slag man, brick man, etc. So if the writer is correct our real competition today is not from men or companies engaged in manufacturing and marketing the same commodity we are but it is from outside resources manufacturing and marketing commodities that can be substituted for ours in competing for the buyer's dollar.

If the reader agrees with the writer on these questions and takes a broader view of the crushed stone industry, making it a profit seeking industry and one united among themselves and united against outside competition there will come a mutual understanding, appreciation and respect for each other which will be amazing.

Annual Lime Convention to Be Held at White Sulphur Springs

The Ninth Annual Convention of the National Lime Association will be held May 17, 18 and 19, 1927, at the Greenbriar Hotel, White Sulphur Springs, West Virginia, beginning with a group luncheon on Tuesday, May 17th.

Wednesday, May 18th, will be given over to a full discussion, open to all manufacturers, whether members or not, of the most important problems before the industry concerning promotion and selling. It is anticipated that more real value will be derived from this session than has ever resulted from any previous convention, and it is hoped that every manufacturer of any consequence in the industry will be in attendance and will participate. The discussion will be divided into sections, each being led by a producer who has given special thought and attention to the particular phase of the subject he will discuss in detail.

The tenor of the whole convention will be how the industry can best be developed. So that the maximum time may be available for informal discussions and recreation, no tournaments have been arranged. There will be, however, a banquet on Wednesday night, May 18th. Every lime producer, and particularly those who are not at present members of the Association, is cordially invited to attend the convention and to take an active part in the discussions.

Annual Asphalt Paving Conference To Be Held at Atlanta

The Sixth Annual Asphalt Paving Conference is announced to be held at the Atlanta-Biltmore Hotel, Atlanta, Georgia, during the week of November 28, 1927. The conference is held under the auspices of The Asphalt Association, of which Mr. J. S. Helm of the Standard Oil Company of New Jersey, New York City, is president. The Association of Asphalt Paving Technologists, of which Mr. Hugh W. Skidmore of the Chicago Paving Laboratory, Chicago, is president, will cooperate with The Asphalt Association in the holding of a joint conference.

Forty Million Automobiles By 1940 Predicted By Engineer

H. C. Crowell, Assistant Chief Engineer of the Pennsylvania Railroad, predicted that the United States would have 40,000,000 pleasure and utility automobiles by 1940 if the present ratio of increase in motor vehicles is maintained. Mr. Crowell made this prediction in an address before the twenty-eighth annual meeting of the American Railway Engineering Association on March 8, 1927, at Chicago.

SOURCES OF DUST IN COAL MINES

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PART II

In part I of this article which appeared in the last issue, the authors analyse the following subjects: conditions of mining; collection of dust samples; composition of dust samples; dust produced by undercutting dry; and dust produced by hand drilling. Tables are also given recording the findings for each subject and the data recorded is discussed.—Editor.

Dust Produced When Undercutting Wet

Table 6 shows the dust produced when water is sprayed on the cutter-bars of machines. Water at the rate of 30 to 50 gallons per 100 square feet of undercutting was applied under pressure through ¼ to ½-inch pipes either on the ingoing bits near the machine, or sprayed over the cutter-bar near the machine on the ingoing side, or at the far end of the cutter-bar. (See figures 1, 2 and 3).

Table 6.—Dustiness by mines when undercutting wet.*

Mine	No. of Samples	Millions of dust particles per cubic meter			Milligrams of dust particles per cubic meter		
		+10	—10	Total	+10	—10	Total
E	1	61	1,337	1,398	25.5	27.1	52.6
G	2	22	1,382	1,404	24.0	25.3	49.3

*Compare with Table 3, undercutting dry.

Discussion of Data

Although only a few samples are represented here, their close agreement would seem to point to their reliability. It is very apparent that the use of water on the cutter-bar greatly reduces the amount of dust raised. Two mines sampled under these conditions showed averages of 1,398 and 1,404 million dust particles weighing 52.6 and 49.3 milligrams, respectively, raised into each cubic meter of air breathed by the men. A certain amount of dust was raised by the movement of the mining machine and men in the working place before cutting was commenced and also by the picking in roof necessary to set the jack pipe.

Dust Produced When Pick Mining and Loading Coal

Table 7 gives the amount of dust raised when pick mining and loading coal was under way:

Table 7.—Dustiness by mines when pick mining and loading coal.

Mine	No. of Samples	Millions of dust particles per cubic meter			Milligrams of dust particles per cubic meter		
		+10	—10	Total	+10	—10	Total
D	1	31	1,728	1,759	11.3	14.1	25.4
K	2	24	731	755	19.1	15.5	34.6
O	7	49	423	472	27.7	14.7	42.4

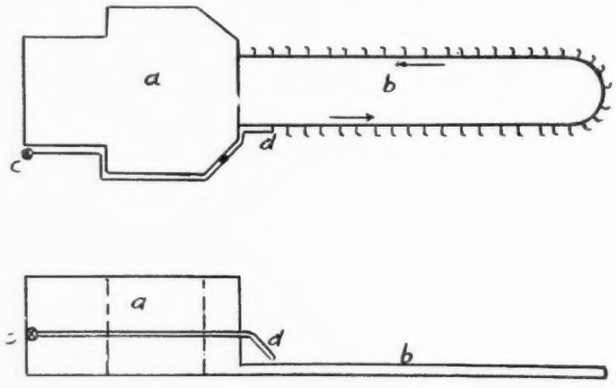


Figure 2—Method of Applying Water on Ingoing Bits Close to Machine
a—Mining machine; b—cutter bar; c—connections of flexible hose to machine; d—point of water discharge

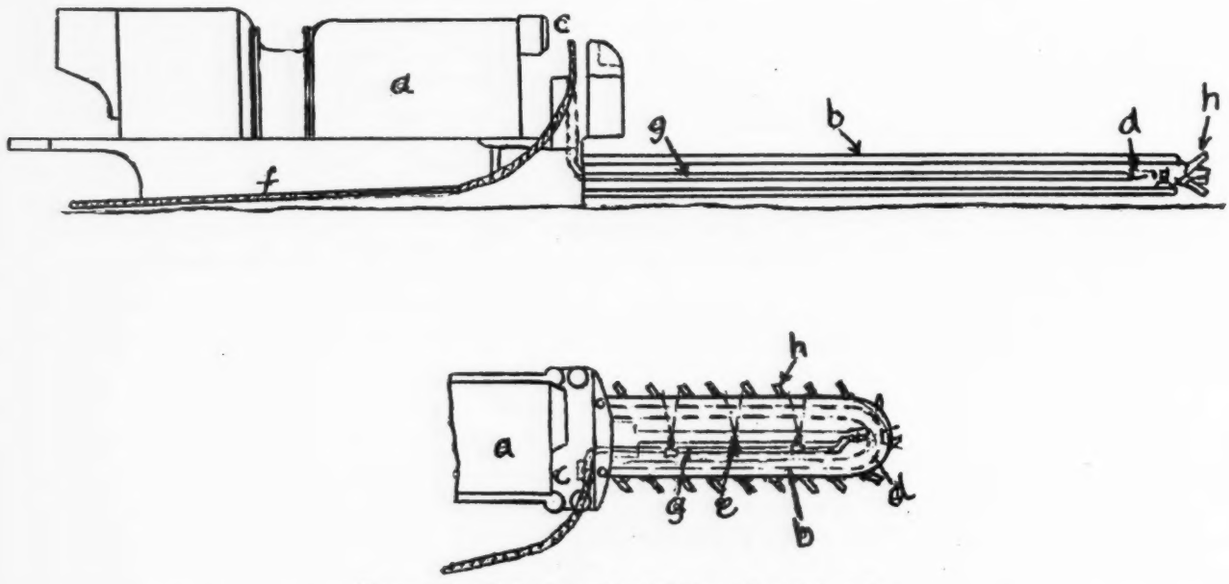


Figure 1—Method of Applying Water at Far End of Bar.
a—Mining machine; b—cutter bar; c—connection of flexible hose to machine; d—end nozzle for water discharge; e—side nozzles; f—flexible water hose; g—water pipe to end of bar; h—bits.

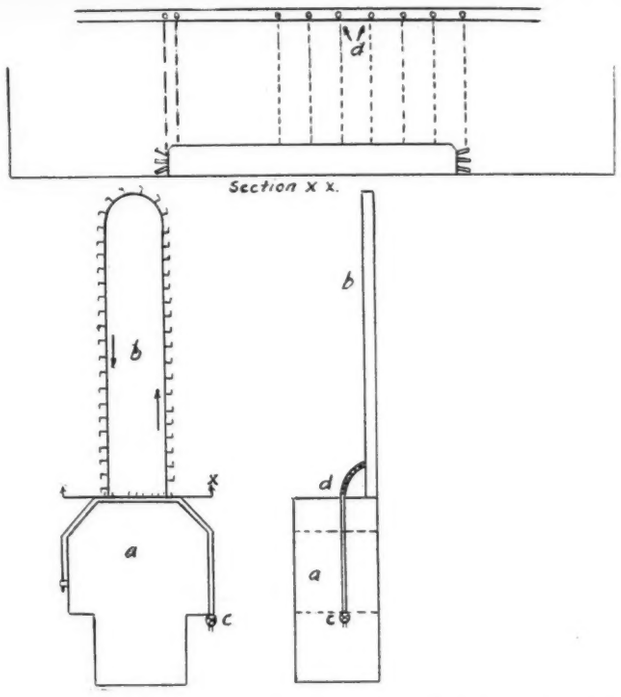


Figure 3—Method of Applying Water Over Half Section of Cutter Bar on Ingoing Bits
a—Mining machine; b—cutter bar; c—connections of flexible hose to machine; d—points to water discharge

Discussion of Data

In the three mines in which these samples were collected the range in dustiness was from 1,759 to 472 million particles per cubic meter air, and from 25.4 to 42.4 milligrams, respectively. Pick mining was practiced chiefly where it was necessary for the miner to pick down enough coal to complete loading a car. It raised less dust than loading in the absence of picking. This was due to the intermittent loading, which gave the dust opportunity to clear while picking.

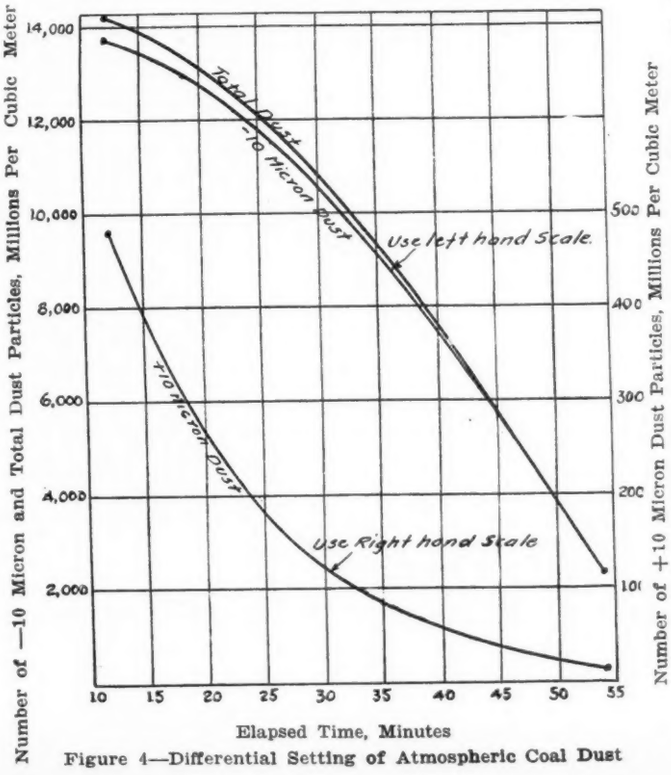


Figure 4—Differential Setting of Atmospheric Coal Dust

Dust Produced by Haulage Operations

Table 8 gives the results of sampling for dust produced by three types of haulage operations:

Table 8.—Dustiness by mines during haulage operations.

Mine	No. of Samples	Millions of dust particles per cubic meter			Milligrams of dust particles per cubic meter		
		+10	—10	Total	+10	—10	Total
				Mules			
M	1	30	1,829	1,859	44.4	17.0	61.4
P	8a	5	598	603	4.4	3.1	7.5
B	2	8	44	44	0.4	0.5	0.9
				Motors			
L	3	8	504	512	0.0	0.2	0.2
M	3	3	331	334	16.1	9.2	25.3
K	4	6	297	303	8.5	31.6	40.1
H	3	9	227	236	10.9	5.4	16.3
F	7	8	172	180	3.2	1.4	4.6
E	4	2	145	147	0.0	0.0	0.0
O	2	16	86	102	0.0	0.0	0.0
N	8	1	79	80	0.4	0.2	0.6
				Ropes			
P	9*	3	231	234	3.4	1.5	4.9
N	8	2	86	88	1.3	0.9	2.2
I	6	0	39	39	0.6	0.2	0.8

*Samples collected in entries which had been rock-dusted 6 months previously, but which were ready for re-dusting.

Discussion of Data

This table shows the concentration of dust raised by mules, motors, and rope haulage. This dust is due to the sweeping of fine particles from tops of loaded cars, the grinding of fallen coal by wheels of many trips, and the seepage of fine particles from cracks of cars onto roadways and, to a lesser extent, to the agitation of the dust deposited on ribs, roof, and floor. Mule haulage stirred up the most dust. It is evident that mules, in traveling back and forth from working places along haulageways, raise decidedly more dust than motors or ropes, due to kicking and scuffing by the animals of material between the rails. Furthermore, the constant trampling grinds this dust to a finer size which, when raised in the air, tends to remain suspended unless removed by ventilating currents. This fact is brought out by comparing the dust made by mule haulage and by motor haulage and rope haulage.

The maximum dust condition was shown in a mine represented by a single sample with a total count of 1,859 million particles per cubic meter of air. In another mine, 8 samples were taken which averaged 603 million particles. The minimum dust conditions were found in a third mine where water was used plentifully at the face while coal was being undercut, after coal was broken down and where loaded cars were sprayed before leaving working places. Here two samples taken in larger development entries showed a total count of 44 million particles per cubic meter of air. This striking comparison between samples collected where dry methods were used exclusively at the face as against wet methods, shows how the latter affect the dust raised along the haulageways.

Under motor haulage in Table 8 are shown a large number of samples taken in 8 different mines. The count of dust particles per cubic meter of air

ranged from 512 to 80 million. The minimum average (80) was obtained from 8 samples collected in a mine where water was used liberally, not only spraying incoming and outgoing trips of loaded and empty cars, but using water on the cutter-bar and drenching coal after being broken down. Under rope haulage are shown a number of samples taken in three different mines in widely scattered States. It will be seen that the count ranged from 234 to 39 million particles per cubic meter air. Here again the low count of 39 million is an average from a mine where water was used plentifully at the face, and where incoming and outgoing trips were watered. The weight of dust in milligrams per cubic meter air parallels very closely the respective counts.

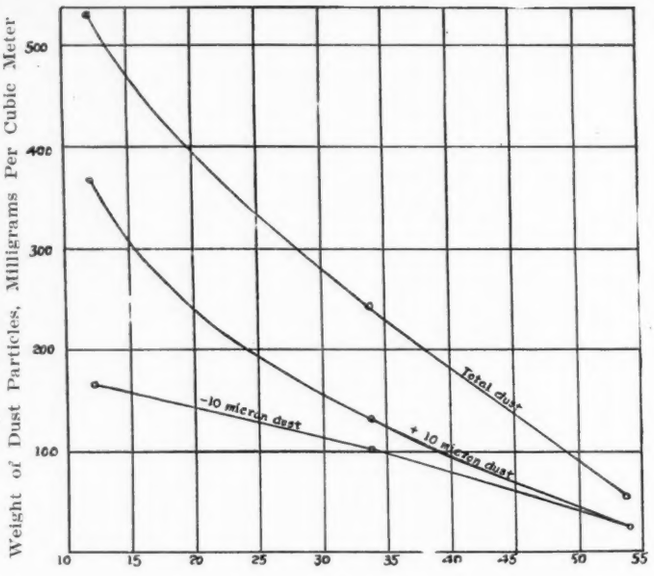


Figure 5—Differential Settling of Atmospheric Coal Dust

Prevention of Dust

The principal factors that enter into the prevention of coal dust as determined by this study are the application of water to the cutter-bar of mining machines, watering coal before and after loading, water sprays at main partings or key points, and spraying ingoing empty cars.

The most prolific source of coal dust as brought out by this study is dry undercutting in coal mines. It will be observed by reference to Table 1, "Dustiness by Operations," that dust from undercutting dry averaged 9,810 million particles per cubic meter air, but where water was applied to the cutter-bar, the average of 1,402 million, or approximately one-seventh that when undercutting dry. In addition to the use of water on the cutter-bar, water was applied in a number of instances by miners with a hose to the coal after it had been broken down. They also washed the face of workings and drenched the loaded cars before these left the working places. That less dust was found in the air of haulageways in those mines in which water was used plentifully at the face than in those using dry methods is shown in Table 8. It is evident that in such a case less dust is present in the air of the working places to be carried by ventilating currents, also, less dust can be swept from cars which have previously been drenched with water. Furthermore, the dripping of water from such cars will keep the road dust damp, thus making it difficult for moving air currents to sweep it into the atmosphere.

In addition to these factors, the use of water sprays at main partings or other key points underground to wet loaded or empty cars, which have lost some of their moisture, is another means of reducing the atmospheric dustiness. These losses may occur during delays and by exposure to moving air currents occasioned by long hauls. The spraying of ingoing empty cars provides another means by which to reduce the dust in the air. A certain amount of coal dust remains in the cars after they have been dumped. The spraying of these cars before entering the mine to a large extent prevents this dust drying if damp, or falling from or through the car if dry. This was practiced to some degree in some of the mines where this study was made and no doubt contributed to the low concentration of dust found in the air of certain haulageways.

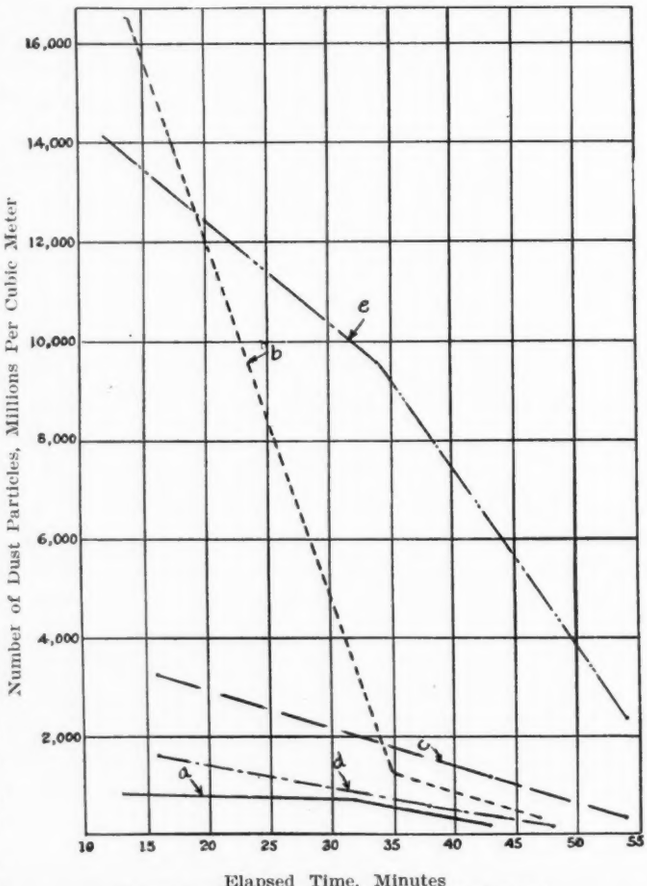


Figure 6—Settling of Atmospheric Coal Dust

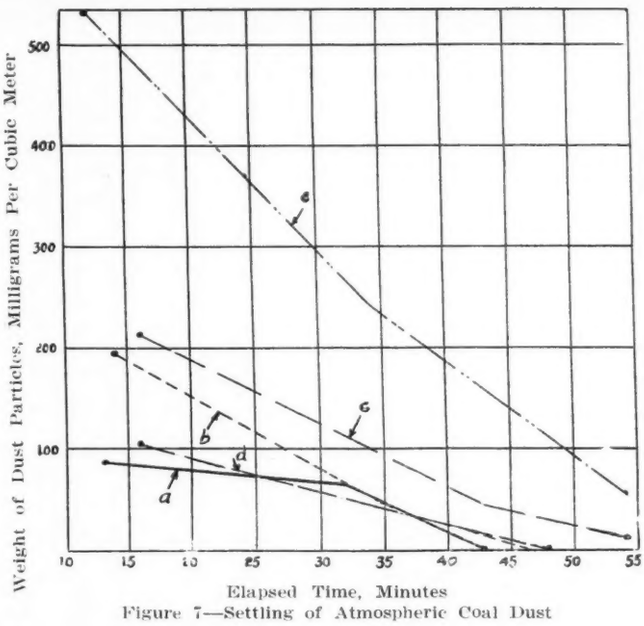


Figure 7—Settling of Atmospheric Coal Dust

Mechanical drilling has been shown to raise much more dust than any of the other mining operations. In some instances, this is not coal dust, but rather the sandstone or shale material that overlies the coal. However, there is a definite hazard connected therewith which would be greatly reduced by the substitution of wet for dry drilling methods. It has been repeatedly shown by investigations in metal mines that wet drills raise but a fraction of the amount of dust produced by corresponding dry tools. Coal as well as metal mines should avail themselves of this improved practice.

Other Dust-Producing Agencies and Remedies Therefor

There are certain other agencies which contribute to the amount of dust in a mine, but on which no figures have here been given. Inasmuch as they can easily be remedied and a certain amount of atmospheric dust therefore avoided, it has been thought wise to include them. Coal dust spilled along haulageways can be caught and raised into the air by air currents caused either by ventilation or by the movements of trips. A great deal of such spillage can be prevented by the use of tight end cars in place of the loose end-gate type so much in vogue.

Lump coal which falls from trips onto the tracks is soon broken and ground into dust by the passage of trips, as shown in Table 8. This can then be stirred up by all air currents which pass. A minimum topping of all cars would reduce this spillage to a negligible quantity. Many mine cars are allowed to remain in very poor repair. Often wheels have worn unevenly or are broken so that they are not true. Rapid movement of such a car would tend to shake coal off the top and through the cracks.

Much dust on haulage roads is due to uneven, poorly laid track. For this reason all track should be carefully laid and all installations to be used over a long period should be well graded, ballasted with rock, and well maintained. The ballast should be gravel, surface soil, slag, or cinders, but never coal. Maintenance should include the frequent cleaning of track by company men definitely assigned to this job.

Removal of Dust

Although the liberal use of water greatly reduces the amount of dust formed, it should be supplemented by sufficient quantities of circulating air to remove any dust that may be raised. In nearly all of the samples taken at the face there was little or no movement of air and as a result some extremely fine dust remained suspended over a considerable period. This condition could have been obviated by supplying moving air at the face of workings.

Figures 4 and 5 show graphically that dust below 10 microns in size remains suspended for a longer period than dust above 10 microns. This smaller size of dust is probably more harmful than the larger particles because of the large amount of surface exposed, hence it should be removed by ventilation as quickly as possible. The free settlement of dust where there was almost no air movement is shown graphically for five separate samples in Figures 6 and 7; in Figure 6 the total counts are plotted, while in Figure 7 the corresponding weights are used and lettered similarly. These graphs show that if sufficient time is allowed, dust will settle and so be removed from the air, but the quickest and most efficient method for its removal is by providing sufficient circulating air to the face of workings to remove it as formed.

Advantages in Decreasing the Amount of Coal Dust

Because the presence of coal dust in mine air presents an explosion hazard, the question of decreasing its amount is extremely important. The Bureau of Mines has recommended that all coal mines be rock-dusted as an explosion preventive. This investigation forcibly brings out the fact that the liberal use of water at the face of workings greatly reduces the amount of coal dust raised. It is not the intention of the writers to advocate the use of water in place of rock-dusting back from the face of workings, but rather to supplement it. Furthermore, it would be an economical measure to use water at such points because, if less coal dust was raised into the air and carried by ventilating currents to be deposited on the ribs, roof, and floor over the rock dust, the life of an application of rock dust would be greatly lengthened.

Conclusions

The following conclusions are arrived at from this investigation:

1. Jackhammer drilling produced the greatest concentrations of dust of any of the mine operations, 10 times as much as any of the others, and the other dust-producing operations arranged in decreasing order of concentration were electric drilling, undercutting coal by dry methods, auger drilling by hand, loading coal, undercutting coal with the application of water on cutter-bar of mining machines, simultaneous pick mining and loading coal, loading rock, haulage, and finally, pick mining.

2. The largest total amount of dust was raised by dry undercutting.

3. Undercutting coal without the use of water on the cutter-bar raised the greatest concentration of dust of any of the common mine operations; loading coal ranked next and haulage last.

4. The chief method for the prevention of dust is the liberal use of water at the face of workings to prevent the dust at its source. It was found that after water had been applied to cutter-bars the amount of dust was reduced to one-seventh of that raised by dry cutting. Moreover, samples taken out by the face of workings where water was used plentifully at the face show a decided decrease in the amount of dust over mines exclusively using dry methods.

5. In almost every instance where sampling was done at the face there was no air movement and the dust was removed almost entirely by free settlement. The best method for removing suspended dust is to provide sufficient circulating air to the face of workings.

6. The ideal combination for explosion prevention is the widespread use of rock dust supplemented with liberal use of water at the face.

How the Different States Rank in Mineral Production

A compilation of mineral production by states, covering the year 1925, made by the United States Bureau of Mines, Department of Commerce, emphasizes the generally unrealized fact that certain eastern states contribute tremendously to the nation's mineral output. The compilation also evidences the overwhelming preponderance of coal and oil as factors in the nation's mineral production.

Pennsylvania, with its enormous coal production, leads all of the states, with a total mineral output in 1925 of $867,196,000. Oklahoma, with an output of $501,767,000, mainly petroleum, was the second state. California ranked third, with a total mineral production of $496,923,000, largely made up of petroleum. Texas, another tremendous oil producer, ranked fourth, with a production amounting to $351,212,000. West Virginia, with an output of $333,528,000, ranked fifth, and here again coal was the big factor.

The following table gives the total mineral output of the different states, with the principal minerals constituting the production. In this compilation, iron ore, not pig iron, is taken as the basis of valuation of iron. In the case of other metals, mine production, that is, the recoverable content of the metals, is the basis used.

State	Principal Mineral Products	Amount
Pennsylvania	Coal, cement, clay products, natural gas	$867,196,000
Oklahoma	Petroleum, zinc, natural gas	501,767,000
California	Petroleum, natural gas, cement	496,923,000
Texas	Petroleum, natural gas, sulphur	351,212,000
West Virginia	Coal, natural gas, petroleum, clay products	333,528,000
Ohio	Clay products, coal, natural gas, petroleum	247,507,000
Illinois	Coal, clay products, petroleum, cement	231,680,000
Kansas	Petroleum, zinc, coal, cement	142,944,000
Kentucky	Coal, petroleum, clay products, natural gas	131,371,000
Michigan	Iron ore, copper, cement, salt	122,212,000
Arizona	Copper, silver, gold, lead	114,203,000
Indiana	Coal, cement, stone, clay products	111,834,000
Minnesota	Iron ore, stone, cement, clay products	110,253,000
New York	Clay products, gypsum, cement, stone	102,036,000
Utah	Copper, lead, silver, coal	100,275,000
Missouri	Lead, clay products, cement, coal	92,548,000
Arkansas	Petroleum, natural gas, coal	87,186,000
Montana	Copper, silver, zinc, coal	79,261,000
Wyoming	Petroleum, coal, natural gas	78,755,000
Alabama	Coal, iron ore, cement, clay products	77,139,000
New Jersey	Clay products, zinc, cement, sand and gravel	76,764,000
Colorado	Coal, gold, lead, zinc	63,149,000
Louisiana	Petroleum, sulphur, natural gas	60,504,000
Virginia	Coal, clay products, stone, gypsum	41,038,000
Tennessee	Coal, cement, clay products, stone	38,869,000
Iowa	Coal, cement, gypsum, clay products	38,420,000
Idaho	Lead, silver, zinc, copper	31,611,000
Nevada	Copper, silver, gold, lead	26,470,000
New Mexico	Copper, coal, petroleum, zinc	25,549,000
Washington	Coal, cement, clay products, sand and gravel	22,382,000
Maryland	Coal, cement, clay products, sand and gravel	21,558,000
Wisconsin	Stone, zinc, sand and gravel, iron ore	19,205,000
Alaska	Copper, gold, silver, coal	18,286,000
Massachusetts	Stone, clay products, sand and gravel, lime	16,832,000
Florida	Phosphate rock, stone, sand, fuller's earth	16,651,000
Georgia	Clay products, stone, cement, fuller's earth	16,504,000
Vermont	Stone, slate, lime, talc	14,409,000
North Carolina	Clay products, stone, sand and gravel, feldspar	9,504,000
South Dakota	Gold, sand and gravel, stone, gypsum	7,972,000
Oregon	Cement, sand and gravel, stone, clay products	7,827,000
Connecticut	Clay products, stone, lime, sand and gravel	6,755,000
Maine	Stone, lime, clay products, slate	5,839,000
South Carolina	Clay products, stone, sand and gravel, barite	3,508,000
New Hampshire	Stone, clay products, sand and gravel, feldspar	3,465,000
Nebraska	Cement, sand and gravel, clay products, stone	3,359,000
North Dakota	Coal, clay products, sand and gravel	2,662,000
Mississippi	Sand and gravel, clay products, stone	2,172,000
Rhode Island	Stone, clay products, sand and gravel, lime	1,152,000
District of Columbia	Sand and gravel, clay products, stone	955,000
Delaware	Clay products, stone, sand and gravel	539,000

E. J. DE LORENZO CLEARLY DEMONSTRATES WHAT CAN BE DONE BY ONE MAN

By George Ransom

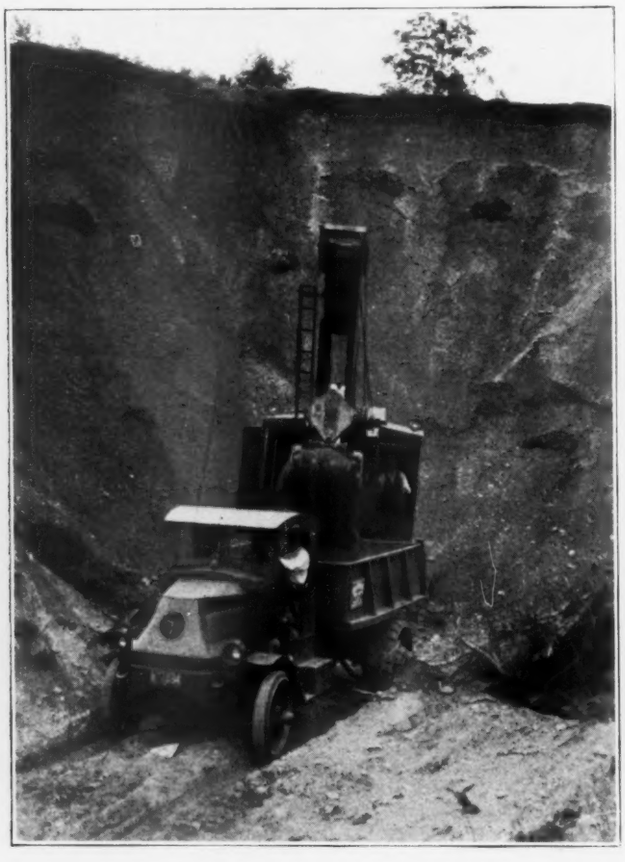
ABOUT ten miles southwest of Boston, Massachusetts, is located the plant of the Riverside Sand and Gravel Company. The deposit covers about 13 acres and runs to a depth of 125 feet. The material passes the required specifications without washing. The plant comprises two sections, the main unit consisting of a derrick and clamshell for excavation, while the second unit involves a dragline bucket for bringing the material within reach of another derrick and clamshell. The efficiency of the operations is due largely to the management of Edward J. DeLorenzo, chief engineer for the Riverside Sand and Gravel Company. Mr. De Lorenzo is in complete charge of plant operation and one factor in his intimate knowledge of the plant details is his habit of occasionally jumping and running the shovel or some other machine himself. His ideas have been incorporated into many angles of the plant and a study of the operation as a whole will be worth while.

Excavating is done by an Insley steel derrick with a 115 foot boom equipped with a 2 yard Blaw-Knox clamshell bucket which picks the material up and discharges into a hopper. The derrick is operated by a 10x13 inch Mundy steam driven three drum hoist. This derrick is built up in sections and can be moved from one position to another without much trouble. The time from bite to bite of the clamshell involves one minute on the average. This means a minimum of 60 yards per hour, but it is possible to increase this to 100 yards per hour. Blue center Roebling wire rope is used chiefly although some Leschen Hercules wire rope has been purchased recently. The material in the hopper is fed by an Underwood pulsating feeder to an Underwood 4x12 scalping screen with 2 inch perforations. The oversize is sent to a 20x24 New England Road Machinery jaw crusher, and after recrushing it is again sent to the scalping screen.

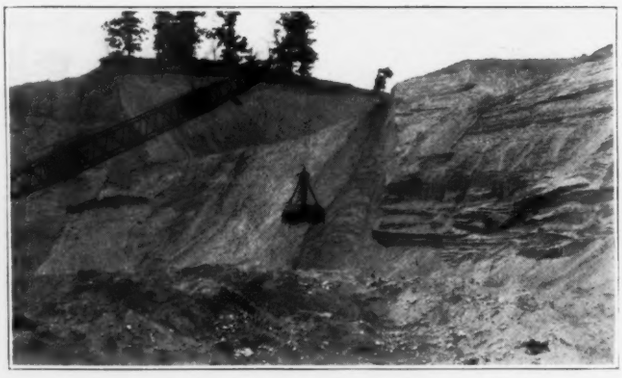
The crushed stone from the crusher and the material from the scalping screen are picked up by a 20 inch belt approximately 275 feet long and delivered to the main screening plant. The belt for the conveyors is a product of the Boston Woven Hose and Belting Company. Sizing is done on top of the storage bins by 48 inch by 30 foot Underwood rotary screen which turns out six sizes. These are sand for brick mortar, concrete sand, rough sand for making blocks and concrete, pea stone for driveways, roofs and other purposes, and 1 inch and 2 inch gravel. Oversizes which accumulate at this point in the form of tailings are car-

Excavating the Material with Derrick Equipped with Clamshell Bucket

Bucket Dumping Load of Material into Hopper Over Scalping Screen and Crusher



Gasoline Shovel Loading Truck with Coarse Material



View of Sand Pit and Bucket

ried in a short 14 inch belt conveyor, about 25 feet long, to the secondary Champion Jaw crusher. The crushed stone from this is not sized but drops into a separate bin.

In the second unit of the plant a Sauerman 2 yard scraper operated by an 8¼x10 inch two drum Mundy steam hoist brings the material within the radius of a Dobie wood derrick. This derrick has a 90 foot boom and is equipped with a 1¼ yard Blaw-Knox clamshell bucket. The derrick is operated by an 8¼x10 inch Mundy three drum steam driven hoist. The derrick discharges its load to a hopper located on top of the plant. The material is fed from this hopper by a feeder to an 18 foot rotary screen which separates into four sizes, namely, 1½ inch, ¾ inch, ¼ inch and 3/16 inch down. All the hoists and derricks use Roebling wire rope. All Conveyor idlers are equipped with the Dot System of lubrication. The maximum capacity of the first unit of the plant is approximately 75 yards per hour, while the second has a capacity of about 50 yards per hour.

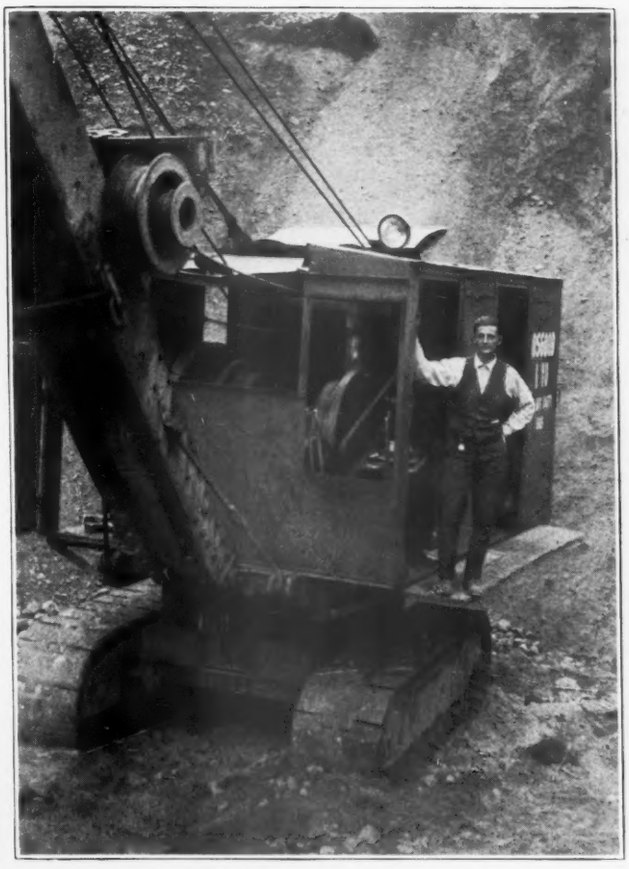
At the present time that portion of the pit reached by the existing derrick has a dearth of the larger sizes of gravel but there is another section which has a good deal of gravel and small cobbles. At this point, an Osgood heavy duty crawling gas shovel, with a 1 yard dipper, is utilized to load motor trucks. These carry the gravelly sand to within reach of the boom of the derrick where they dump. This is not a continuous operation

View of Main Conveyor Housing, back of Screen House and Pile of Surplus Sand

Truck Dumping Load of Material into Pit Where It Can Be Picked up by the Derrick

by any means. It is simply done from time to time to supply more of the larger sizes when they are needed.

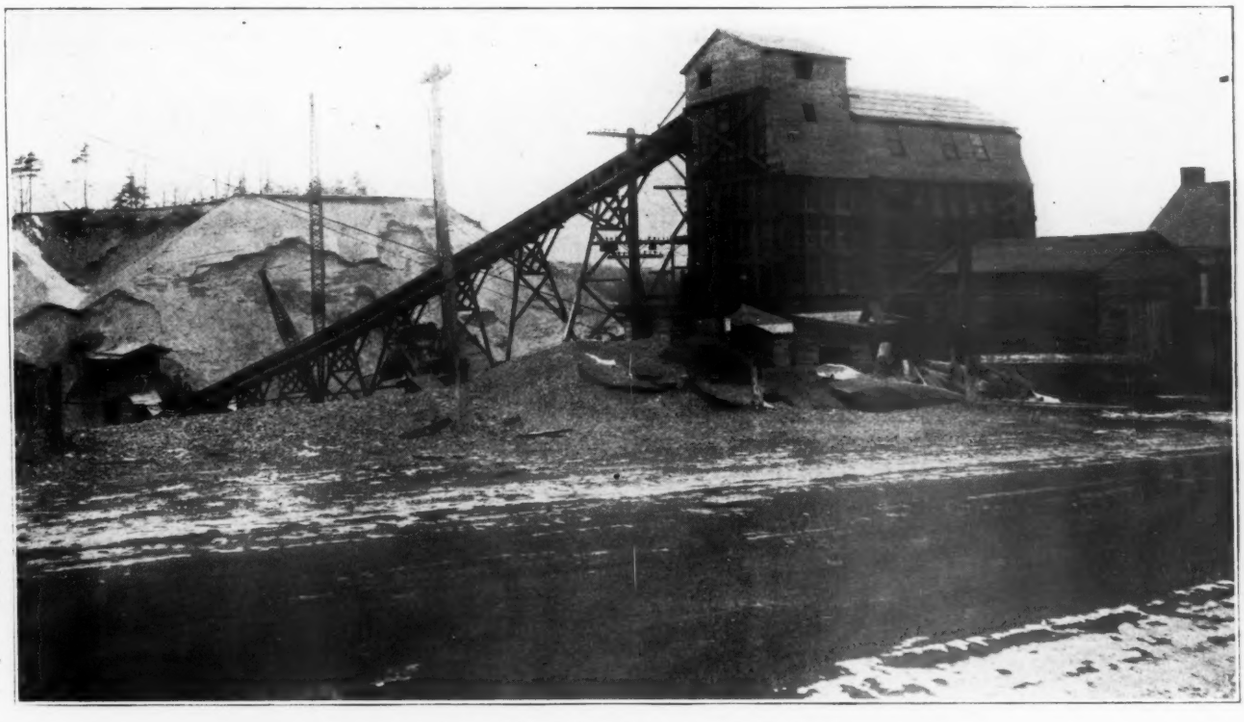
There are other uses for the shovel besides the pit works such as loading trucks from the surplus storage piles. Of course the sand and gravel business is subject to variations in demand from day to day and there is also some variation in the relative



Mr. De Lorenzo and the Crawler Equipped Gasoline Shovel.

Truck Load of Material on Scales Preparing to Leave for Delivery

daily production of the different sizes. Therefore storage piles of surplus material are very necessary to take care of these fluctuations and provide to some extent for emergencies such as breakdown of machinery. The storage piles are made by trucking the surplus from the bins and dumping in a



View of Plant Showing Approach For Trucks

View of Hoist and Operator

convenient location. When these piles must be drawn upon, the trucks are loaded by Conant loaders, of which there are two, one gasoline engine driven and the other electric, if the quantity is not too great. If, as not infrequently happens. some large rush order comes in, the shovel is run up from the pit and used for loading.

All deliveries are made by truck. In some cases customers send their own trucks but most of the material is transported in the company's own machines. It has ten trucks at the present time and often hires extras. Two of these owned by the company are American LaFrance, one a Sterling and seven Macks. All of them have 5 yard bodies except one which has a 6 yard body and with one exception are all equipped with Wood Hydraulic Hoists. The loads are weighed on a Fairbanks scale at the office, which is a very attractive building.

The fact that good clean sand which does not need washing is made provides for winter operation. Last winter, the plant was only shut down one day on account of the weather and is never shut down on account of rain. This is due to Mr. DeLorenzo's good management in devising pit practices which make it possible. In the first place, the surface is carefully stripped so as to keep the sand and gravel clean. In the second place, the bank is worked from the bottom so as to keep it as nearly vertical as possible. Thus, even in rainy weather, the nearly vertical surface is not wet more than an inch or so, and this dries out quickly. It is only necessary to scrape the surface a little to obtain dry material.

The same is true in winter. The very steep face cannot hold much moisture to freeze, no snow at all, and care is always taken to have a face with a southerly exposure to work in winter. This will thaw out very quickly and the frost does not penetrate very deeply. After a snow storm, the snow is cleared away from the bottom of the face by the derrick and bucket, so that a dry place is provided to work in. Winter operation is very necessary for this plant because it supplies a great deal of sand for plaster and other indoor work which keeps up

Loading Machines Near Pile of Surplus Materials

the demand. Moreover, having managed so that it can operate in winter when many others cannot, there is a very good business the year around. In fact, the worst impediment to winter operation is the snow in the highways which makes it difficult at times for the trucks to move the material to the customers.

Midwest Crushed Stone Division Will Meet April 23rd

The Midwest Division of the National Crushed Stone Association will hold a meeting in St. Louis, April 23rd, at the Jefferson Hotel beginning at two o'clock. Col. E. J. McMahon, executive secretary of the St. Louis Quarrymen's Association is receiving reservations and making arrangements. Mr. E. J. Krause, president of the Columbia Quarries Company will be responsible for the surprise features on the program.

Some officers of the National Crushed Stone Association are expected to be present including Otho M. Graves, president, J. R. Boyd, secretary, and A. T. Goldbeck, chief engineer.

Gasoline Consumption Continuing at a Rapidly Increasing Rate

Gasoline consumption broke all records during 1926, according to data by the U. S. Bureau of Mines. Consumption averaged 21,246,000 barrels monthly during 1926 and 18,655,000 barrels during 1925. There are strong indications that 1927 will even surpass 1926.

Since 1917 gasoline consumption has shown a steady increase each year without a break. The 1917 consumption averaged 4,693,000 barrels monthly. During the next two years consumption exceeded 6,000,000 barrels monthly. The eight million barrel mark was passed in 1920 and 1921. There has been an increase of between two and three million barrels on an average monthly basis since 1922.

This increasing consumption of gasoline is an index of the motor travel and the wear and tear of our highway system.

CEMENT COLORING

By Ismar Ginsberg
Consulting Chemical Engineer

MANY advantages are gained in the building of structures which are made from colored cement, but due to the peculiar character of the substance itself there are relatively few colors which are suited for this purpose. The important matter is not that the range of colors is few but that those selected for this purpose be really suited for admixture with cement. The few fast colors that are available for this purpose are sufficient. Each of these pigments has a chemical name by which it is distinguished but it is also called by various trade names and it is important to see that the trade name actually covers the particular pigment whose properties have indicated that it is suitable for this purpose. We are, moreover, concerned only with pigments and colors that are suitable for use with cement and this does not cover the pigments that are used for the making of artificial stones, only in so far as the stone is made from pure cement. Stone that is made with gypsum, for example, will require special consideration as far as selection of color is concerned, for each particular kind of artificial stone will have special chemical and physical properties which have a great deal of influence in determining the selection of the proper pigment. Thus a stone made with gypsum base may be colored with a certain pigment that will not stand up in a stone made with magnesia cement, in which a certain proportion of free magnesium chloride is always found.

Suitable cement pigment must be fast to cement, fast to lime, fast to light and fast to weathering. As a white pigment, lithopone, green seal with thirty-five per cent of zinc sulphide, is suitable. All other kinds of lithopones require the addition of too much other materials to produce the proper white color and this again has a deleterious effect on the setting of the cement. This applies to all such fillers as chalk, china clay, talc and heavy spar which may also be considered as auxiliary white pigments. They cannot be used with cement for they affect its setting. While lithopone contains sixty-five per cent of calcium sulphate, nevertheless this disadvantage is counterbalanced by its high coloring capacity. In using lithopone pigments it should be remembered that certain of them have the disadvantageous property of turning gray when exposed to sunlight. Some lithopones lose this property and are converted into the white condition again but others will be colored gray permanently. The best white pigment is a white portland cement which sets slowly. White lead cannot be used for this purpose at all and zinc white does not mix well with the cement.

Carbon pigments are the only ones that can be used to produce black shades with cement. The manganese black which is recommended for this purpose is nothing more than ignited pyrolusite which has been colored black with carbon pigments. However, manganese black does not possess the coloring power that lampblack or graphite have for cement. Approximately fifteen to twenty per cent of the black pigment is required. Manganese black can be used in spite of the larger amount of it that must be employed, for it has not been found to affect deleteriously the setting properties of the cement. Iron oxide black is also a very good pigment for this purpose, for it is fast to light, fast to cement and resistant to weathering and furthermore it has no bad effect on the setting properties of the cement.

All the natural ochre pigments are usable in the production of yellow shades in cement, provided that these pigments are not mixed with coal tar colors or chrome yellow for the purpose of producing finer shades of yellow. Lead antimonate, Neapolitan yellow, has in the past been recommended for this purpose, but the color is not as satisfactory as the ochres and furthermore it is much more expensive. The same criticism may be applied to all the other artificial yellow and green pigments, all of which may be fairly well suited for this purpose or else give really good results, but they are all uneconomical due to their high price, and cannot compete with good grades of natural ochres.

All the brown ochres, raw and burnt umbers, manganese brown (pyrolusite) and also burnt green earth are suitable for use in producing brown colors in cement. The burnt ochres and pyrolusite give results that are satisfactory in every way and are really hard to beat.

Cement is colored red by means of all the different red-burnt ochre pigments as well as sienna and the important iron oxide pigments. Most of these are made artificially, but some are found in the natural state. There are many pigments which can be used to produce red shades in cement, but some, while giving good results are too expensive for this purpose and others do not distribute themselves well throughout the cement mass. It is therefore necessary to test each pigment and determine how well it mixes with the cement. This is particularly true in the case of the iron oxide pigments, which must be tested each time they are used, for at times the action of the cement itself on the pigment varies considerably. The cement is often found to be at fault for bad results. Nevertheless, it must be mentioned here that the iron

oxide pigments are amongst the most useful of cement pigments for the reason that they are not acid substances. Thus the important thing in testing the oxide pigment is to find out just how neutral it is and also how much iron oxide it contains. The pigment must be free from all tar colors and such pigments as red lead and chrome red, for while these substances may increase the brilliancy of the color, they are harmful in that they retard the setting of the cement. Furthermore, when coal tar colors are employed for this purpose, it is found that they do not retain their color, but turn yellow.

Only green earths are used to produce green shades in cement. Ultramarine green is not miscible in sufficient degree with cement to be usable for this purpose. There are of course quite a number of green pigments which are fast to cement and which might be employed for this purpose, but their price, like that of cobalt green, is too high. Chrome oxide green can be used to advantage in coloring cement green but chrome oxyhydrate cannot be employed for it separates out from the cement. The zinc greens are also unsuitable. Bluish green and greenish blue effects are obtained by mixtures of chrome oxide, alumina and cobaltous oxide. Green earth is, however, the best pigment for this purpose and its color can be shaded by the addition of green iron silicates.

Ultramarine blue is employed to produce blue shades in cement and is a very satisfactory pigment for this purpose. Cobalt blue can also be used in the blue coloring of cement, but it cannot compete with ultramarine on the price basis.

Suitable violets are manganese violet and cobalt violet. Manganese violet is manganese phosphate. It is not well to make up a violet from ultramarine blue and red for the reason that an unattractive grayish violet results. All the cement colors therefore consists of lithopone for white, carbon and manganese black for black, ochres, natural and burnt, for yellows and browns, green earths, natural and burnt for green, iron oxide earths for reds and manganese violet for violet.

Cement colors are tested in different ways to determine their suitability for this purpose. The fineness of the pulverization of the pigment can easily be tested by rubbing a small amount of the same between the fingers. In all the testing it is well to have standard samples of the pigments at hand so that the unknown pigment may be compared with them. Thus, for example, a sample of the pigment may be tested for fineness of particles by suspending it in oil and observing the rate at which it settles to the bottom of the test tube as compared with the standard pigment. The one that sinks to the bottom first is the more coarsely ground. Another method of testing for fineness of grinding is to rub the pigment between two glass plates whereat coarse particles will be detected without any trouble. In testing ultramarine another method is adopted which consists in mixing two grams of the pigment with distilled water to a thick paste adding 300 grams of water and then hanging a broad strip of linen in the solution and comparing the rise of the color in the strip with that which takes place with the standard sample of ultramarine. The finer the particles of the pigment, the higher will the color rise in the linen strip.

Furthermore the finer the grinding of the pigment, the greater will its coloring power be, which varies with the pigment, and then again the finer the pigment, the less disturbance will it cause in the setting of the cement. The determination of the coloring power of the pigment is also a procedure which is based on relative comparison with standards rather than absolute measurement. Thus a standard colored cement powder is employed and the amount of color that is required to give the shade with the same quantity of cement can be determined. Lithopone is tested by mixing ultramarine with ten per cent of standard lithopone and then the amount of the lithopone being tested that must be mixed with the same quantity of ultramarine to give the shade is determined.

Testing the fastness of the pigment to light means the determination of the proportion of coal tar color used to beautify its shade. This is done by treating the pigment with alcohol which dissolves out the dye, the extent of the coloring of the solution being used as an indication of the quantity of dye present in the pigment. When lead chromates are employed in adulterating colors their presence may be determined by testing with sulphuretted hydrogen, which gives a black coloration indicating the presence of lead. Resistance of cement pigments to alkalies is determined by shaking them with a dilute solution of water glass. If the mass becomes quickly sandy and crumbly, then it is an indication that lead and copper colors are apparently present. Ochre which has been mixed with chrome yellow will be flocculated by the water glass, while pure ochre will not. (Editor's Note—This is a paraphrased and condensed translation of the article that appeared in Zement, 1926, pages 325-6 and 344-45.)

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250 Million from Auto Fees in 1926 Used in Building Roads

During 1926, automobile registration and license fees brought $288,282,352 into state treasuries according to a survey completed by the Bureau of Public Roads. Of this sum $190,406,060 was made available for highway construction under state highway departments. The counties received $51,-702,184 for improvement of local roads. The balance was used to cover collection costs, highway department costs, administration expenses, etc.

TOMORROW'S CRUSHED STONE PLANT TODAY NOW COMPLETE IN ALL DETAILS

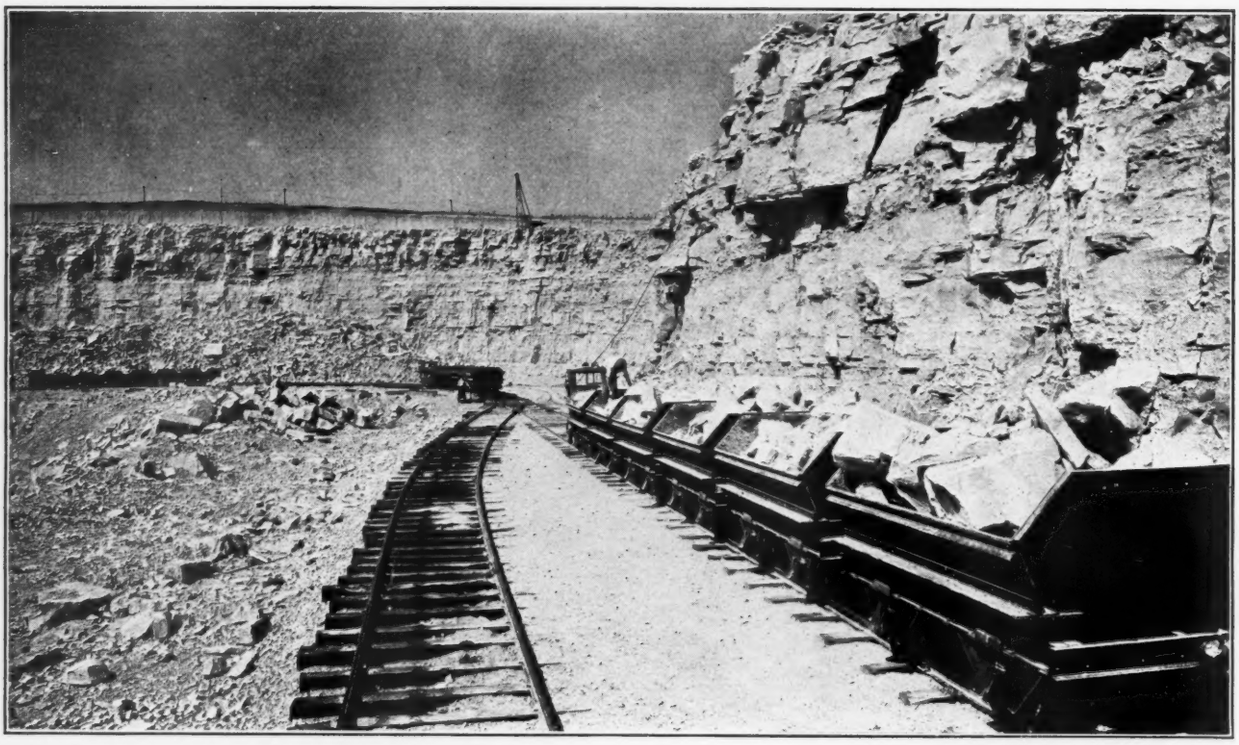
By H. W. Munday

DOWN in St. Louis, Missouri, is a crushed stone company that can lay claim to the title, "The World's Most Progressive Crushed Stone Company." This mythical title, in the writer's opinion, belongs to the Columbia Quarry Company because of what has been done during the past two years with the plant at Krause, Illinois, and what is being planned for the plant at Valmeyer, Illinois. This company has occupied a prominent position in the crushed stone industry for a number of years, but with the completion in detail of the remarkable plant at Krause, Illinois, this past winter and the completion of the progressive plans for the development of the Valmeyer property, the pre-eminent position of this company in the crushed stone industry is established.

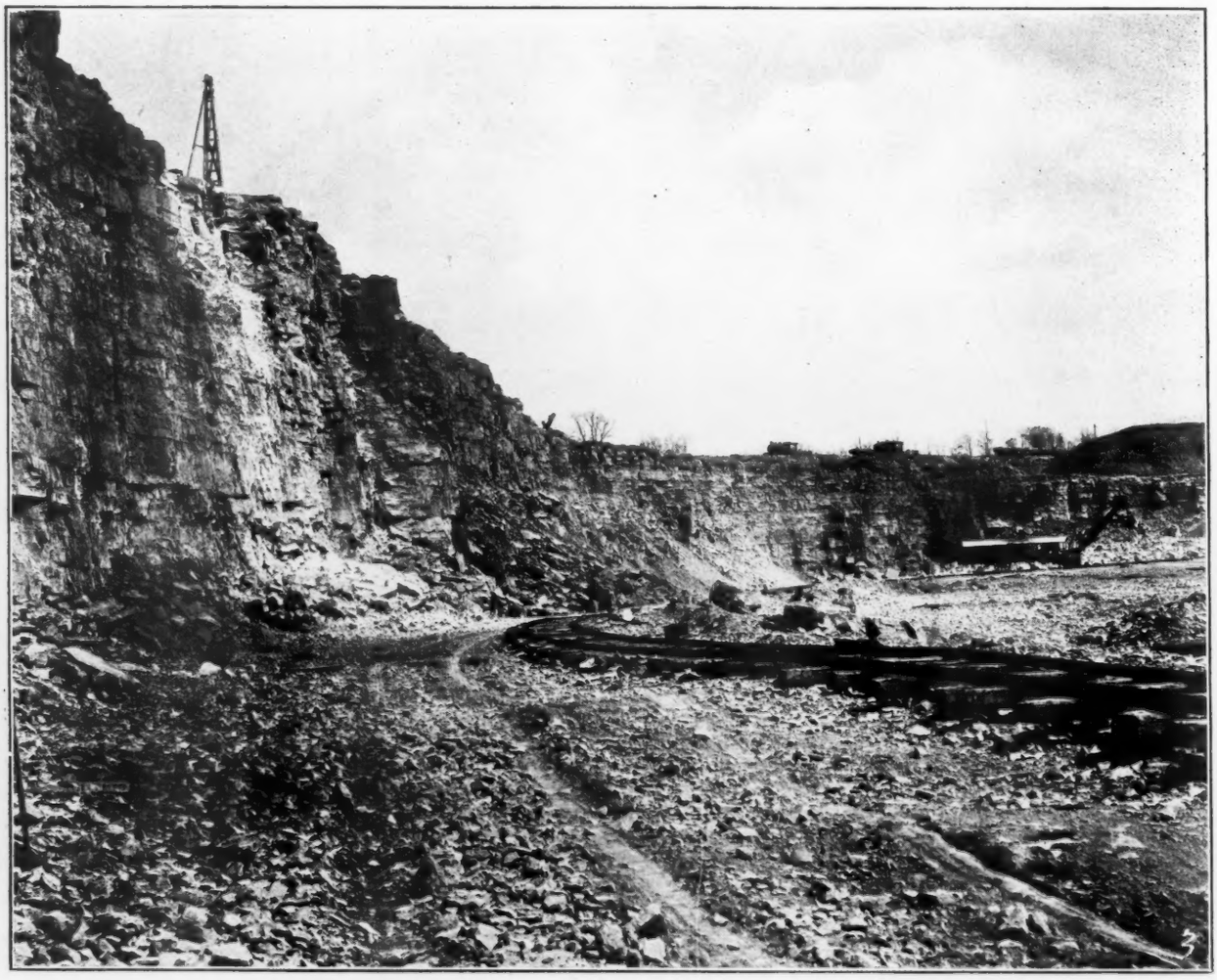
Fire destroyed the plant of the Columbia Quarry Company at Krause, Illinois, on Labor Day, 1924. Mr. E. J. Krause, president of the company immediately made plans for a new plant. Construction was started in the spring of 1925, and stone was produced the same year although the final details which make this plant an achievement in design and workmanship were not completed until a few

E. J. Krause

The Plant at Krause, Illinois, as It Looks Today



A View in the Quarry Showing the Trains of Six Cars Each

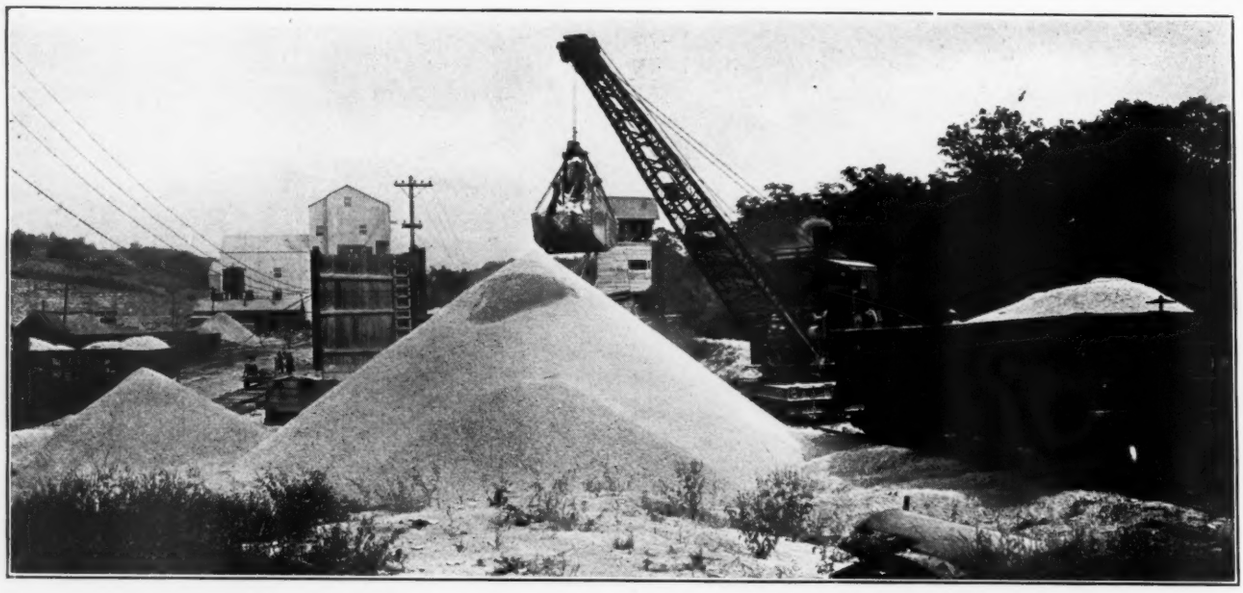


This View Gives An Idea of the Solid Character of the Deposit

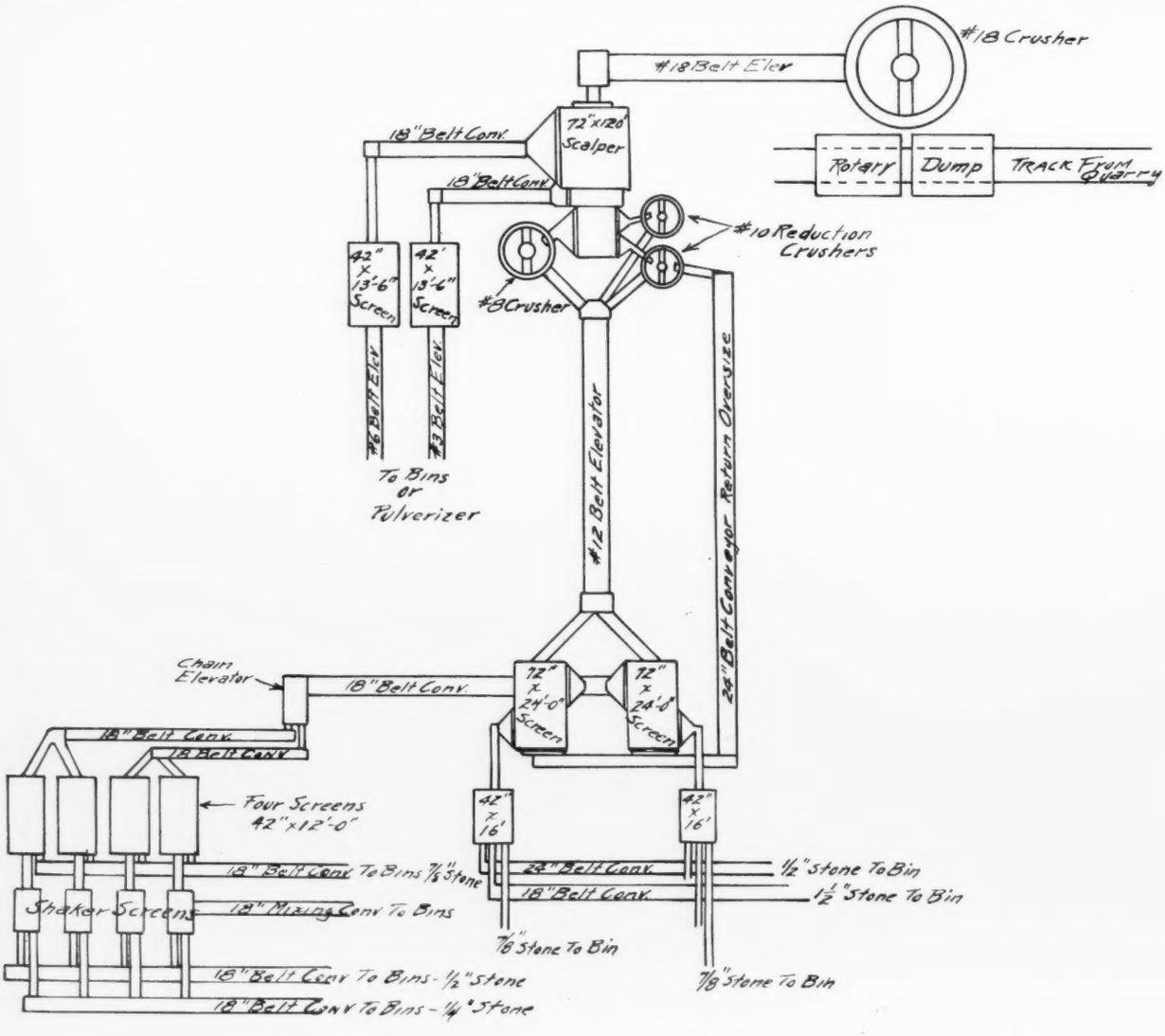
weeks ago. The numerous engineering and business problems involved in building this plant were solved by the cooperation of E. J. Krause, president, C. H. Krause, vice president, H. C. Krause, sales manager, C. E. Glassen, chief engineer, the Allis Chalmers Manufacturing Company, and the Mississippi Valley Structural Steel Company. The finished plant is a monument of design and efficiency. The details indicate the work of a genius. From an engineering standpoint it is in fact "Tomorrow's Crushed Stone Plant Today." The Mississippi Valley Structural Steel Company furnished and erected the steel frame, girders, columns, trestles, galleries, chutes, spouts, storage bins, walls and roof.

The entire structure is completely fireproof. The buildings are structural steel with galvanized corrugated iron siding and roofing. Steel sash windows are used. The foundations and sustaining walls are of concrete and steel covered with concrete. There is no reinforced concrete in the entire structure. Quarter inch aggregate was used instead of sand and two inch aggregate instead of gravel. A concrete bridge, which represents an unusually excellent piece of design and workmanship, leads into and out of the crushing and screening plant. The interior view of the crushing and screening building clear to the roof is something that not more than two or three other plants in the country can equal. The system of floor construction is unusual in that the older type of wall to wall floor has been dispensed with and the gallery type substituted. Care was taken in the design so that sufficient space has been provided around the various machines for inspection and repairs with frequent large open spaces. This feature can readily be appreciated when one realizes that practically every machine in the plant can be seen from the central switchboard where all motors are controlled. All galleries have been made concrete this past winter. All chutes and hoppers are constructed of steel plate with angle iron corners and stiffeners. All spouts are steel and reinforced. These spouts have false bottoms for the removal of dust and are covered to prevent the dust from floating in the air and settling on the finished product. At the receiving end of the elevators and the rejections conveyor steel stone boxes are provided to check the rush of material. This detail reduces wear on the equipment and spillage around the elevator boots. All slip ring motors are equipped with draw type starters and primary oil switches having an overload and an under voltage release. The squirrel cage motors are provided with potential starters and enclosed cutout switches. Even continuous production has been assured by having the capacity of the secondary crushers greater than is customary for the tonnage expected. Wherever possible screen sections have been designed to cut the headroom to a minimum. A unique rotary car

View Taken Early in April Showing the New Pulverizing Plant on This Side



Outside Storage is Used Extensively. Stone is Loaded For Shipment by Locomotive Cranes

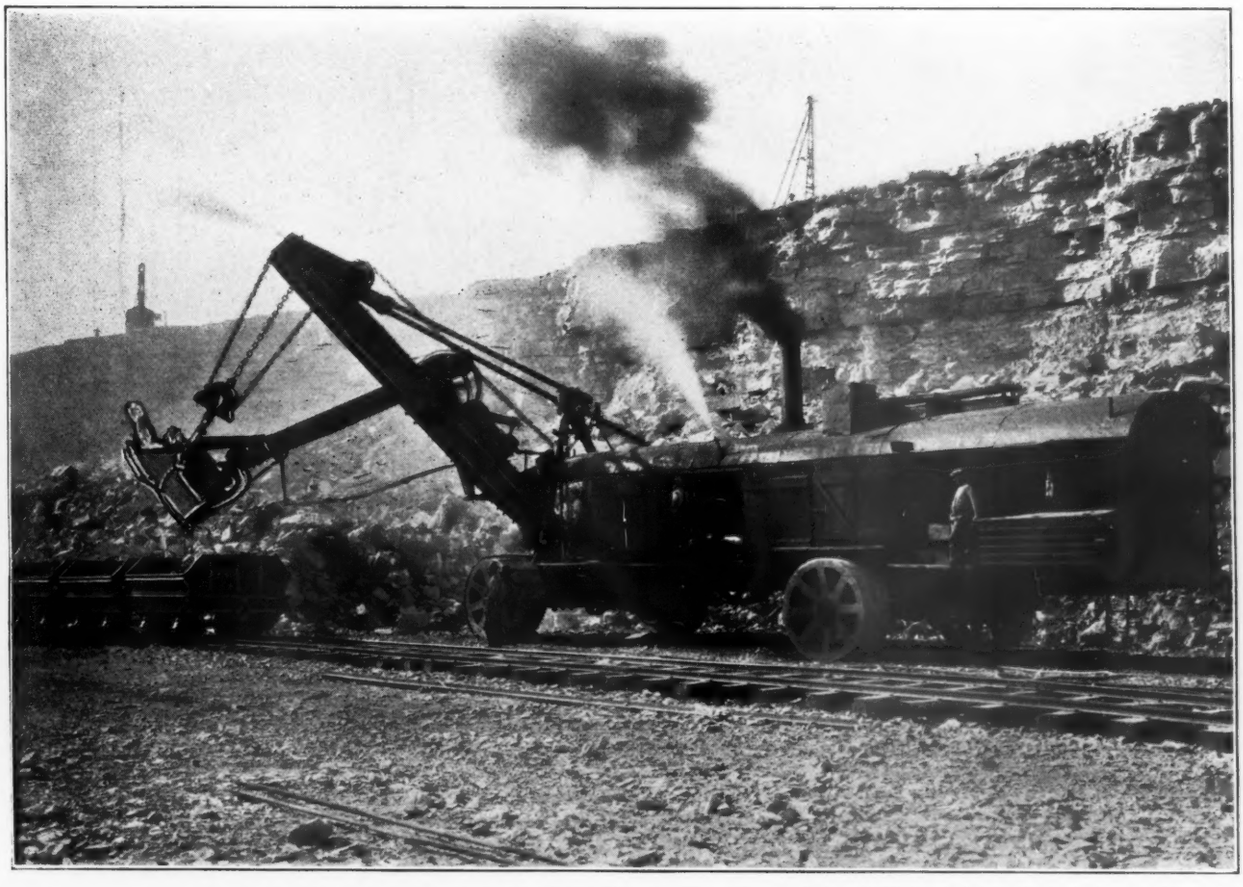


Flow of Material Through the Krause Plant of the Columbia Quarries Company.

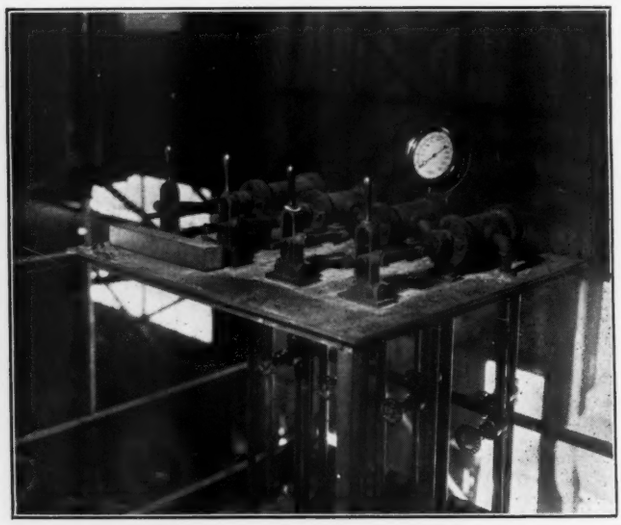
dumper takes the cars as they come in from the quarry and dumps them one or two at a time into the primary crusher. Every safety precaution known has been taken to safeguard the lives of the employees. All the plant equipment has been worked into a scheme of procedure which was distinctly pre-conceived. All these features are evidence of true plant design.

The quarry serving this plant is a hill of limestone which has been developed to a total height of working face of about one hundred and forty feet and fifteen hundred feet in length. The deposit covers about 350 acres. The quarry is worked in two benches of approximately equal height. The reason for this plan is that the lower ledges contain excellent fluxing stone, while the upper ledges contain excellent ballast and commercial stone. The track layout serving the quarry is in the shape of a circle. It is estimated that there are about two million tons of stone in the upper level and about three million tons of stone in the lower level stripped. About twelve feet of overburden has to be removed. This is done with Marion number 31 and number 32 steam shovels equipped with ¾ yard buckets which load the material into 5 yard Koppel cars which are hauled away by either a Vulcan or an American locomotive. Three Sanderson Cyclone well drills place the holes for blasting approximately 15 feet apart and in a row about 25 feet back from the face. Grasselli 60 per cent gelatin and 40 per cent nitro explosives are used. Electric detonators with Cordeau-Bickford fuse explode the charge. Ingersoll Rand and Sullivan jackhammers are used for secondary drilling. A Sullivan air compressor supplies the air for the jackhammer drills. A Curtis compressor is also in use. A Morse centrifugal pump keeps the lower quarry level clear of what little water accumulates. A Gardner duplex pump furnishes the water for the plant.

Two steam shovels, a model 70 and a model 95 Bucyrus, load the stone into 5 yard quarry cars designed by the Columbia Quarry Company. The stone from the upper level is transported over standard gauge track in trains of six cars each, which are hauled by Plymouth gasoline locomotives to the primary crusher. The cars are dumped one or two at a time into the initial crusher by a rotary tipple specially designed by Mr. C. E. Glassen. The individual cars can be dumped without uncoupling them from the train. This is accomplished by designing the tipple so that the rotation is exactly centered in the axis of the draw bars. The draw bars are arranged to swivel in their supports. This last winter the power used in operating this rotary dumper was changed from air to oil using the same fixtures. Now one man controls the whole operation where four were previously used. The dumper in action and the control levers are shown clearly in the illustrations on



Another Quarry View Showing the Large Steam Shovel in Operation



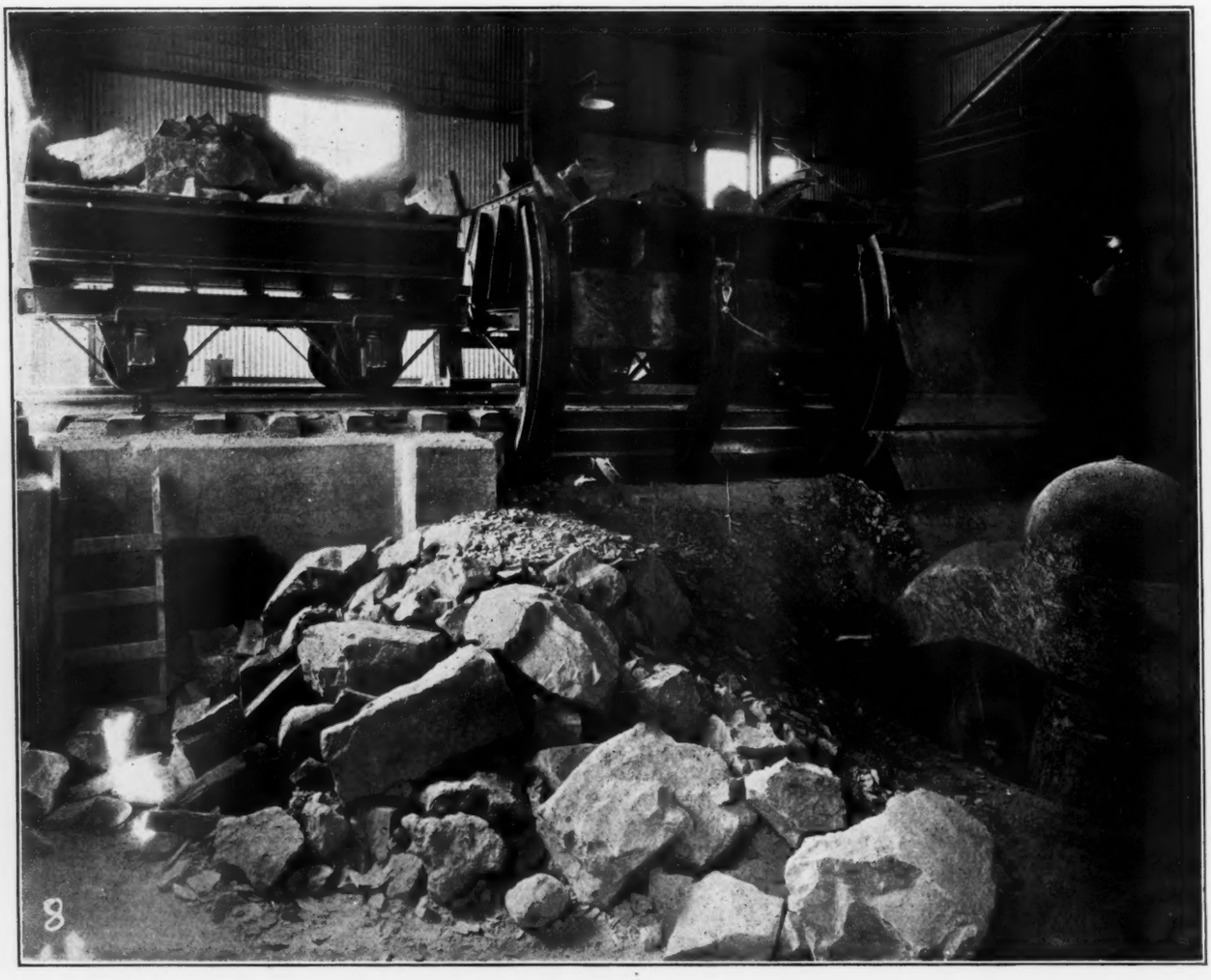
These three views concern the rotary car dumper. Oil is now used for power. Cars may be dumped either one or two at a time without uncoupling any cars in the train.

The lower view shows the dumper about to discharge a car into the number 18 primary jaw crusher.

The upper left hand view shows the platform from which one operator controls the entire operation.

The upper right hand view is a close-up of the lever controls on the operator's platform.

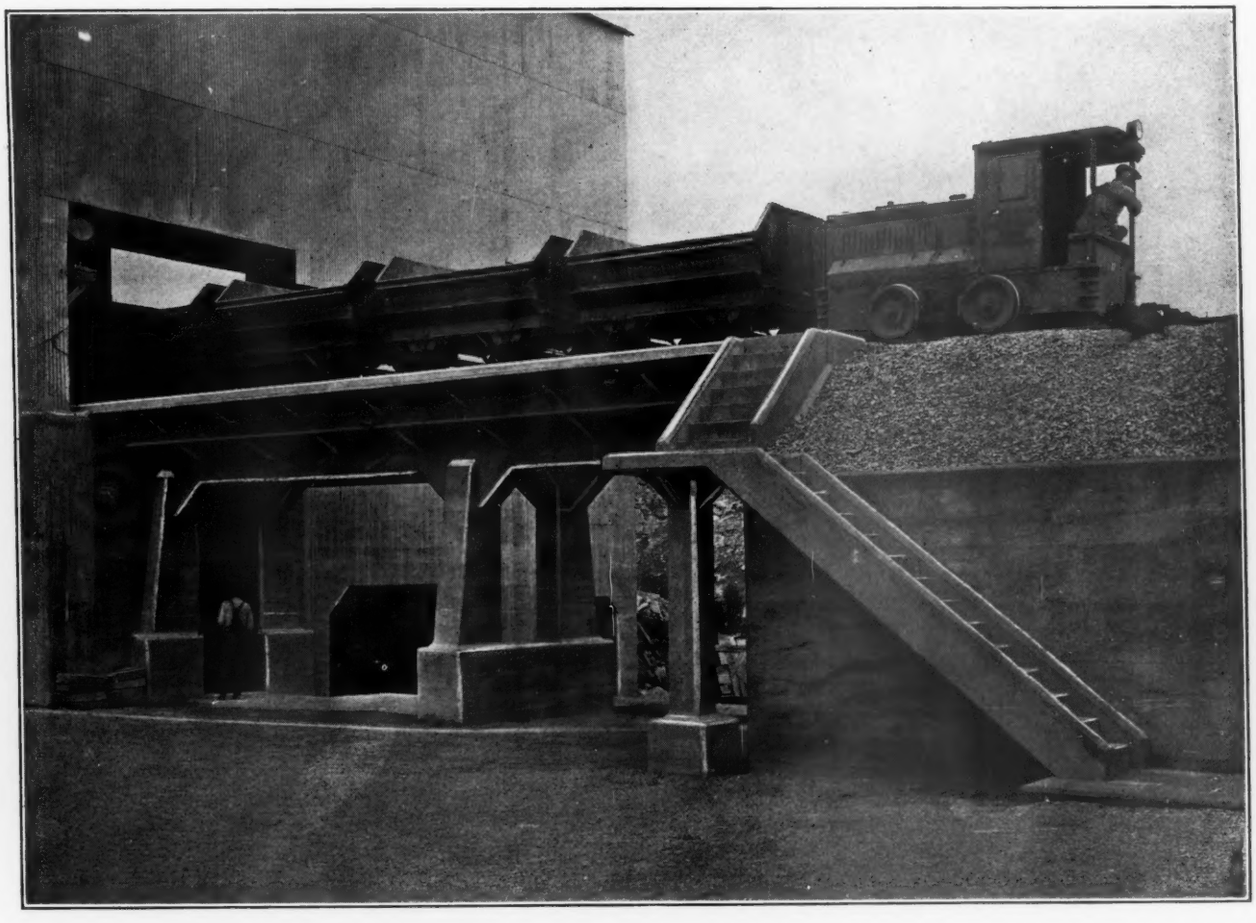
page 76. The hoists turn the tipple ninety degrees and when the power is released, the weight of the empty cars returns the cradle to its normal position. A full cycle can be made in 30 seconds including the time required to move the train ahead for the next car. This dumper has the capacity to feed a larger crusher than the number 18 Allis-Chalmers gyratory crusher. Stone from the lower



level is loaded into a 5 yard car and is hoisted up a single track incline by an Allis-Chalmers 36x36 inch double drum friction hoist and discharged into the crusher. Neither system of dumping interferes with the other as one is on one side of the primary crusher and the other on the opposite side. The hoist is driven by a 100 h.p. squirrel cage motor through an Allis-Chalmers textrope rope.

The primary crusher, which is a number 18 style N Allis-Chalmers, is set to produce 6 inch material. It is fitted with manganese concaves and is belted direct to a 150 h.p. three bearing slip ring Allis-Chalmers motor. This crusher discharges through a steel feed box into a number 18 style C Allis-Chalmers 42 inch bucket elevator, 75 feet between centers. This elevator is equipped with a steel frame and extra heavy head pulley and head shaft. It is belt driven through a speed reducing countershaft by a 40 h.p. slip ring Allis-Chalmers motor.

The number 18 elevator discharges into a 72 inch by 20 foot Allis-Chalmers heavy type open and revolving screen placed at right angles to the elevator and located 33 feet 6 inches above the general ground elevators. The barrel of this screen has twelve feet of 2½ inch holes and eight feet of 6 inch holes. This screen has two jackets made of Ludlow-Saylor spring steel double crimped wire cloth, one having ⅞ inch holes and the other 1½ inch holes. The material passing the 6 inch perforations and retained on the 2½ inch holes drops into a steel feed bin from which it is fed to a battery of two 10 inch Allis-Chalmers Superior McCully fine reduction crushers. One of these crushers is set for a 1½ inch product and the other for a 2 inch product. The oversize material from the scalping screens drops into a steel feed bin from which it passes to a number 8 Allis-Chalmers Gates type K crusher set for a 3 inch product. The two number 10 crushers and the number 8 crusher are each belted direct to 100 h.p. three bearing slip ring Allis-Chalmers motors. The material passing the 2½ inch openings and retained by the 1½ inch and that passing the 1½ retained on the ⅞ inch openings is elevated by an 18 inch bucket conveyor and passed through a 42 inch by 13 feet 6 inch Stephens Adamson screen from which the material is taken by number 3 Allis-Chalmers belt conveyor to bins as finished product or as stock for the pulverizing plant. The minus ⅞ inch material which passes through the outer jacket is also elevated by an 18 inch bucket elevator to another 42 inch by 13 feet 6 inch Stephens Adamson cylindrical screen. This product is taken to bin storage or to the pulverizer plant by a number 6 Allis-Chalmers bucket elevator. The two 42 inch by 13 feet 6 inch screens



A View of the Concrete Bridge Approach to the Crushing Plant. This Bridge is a Smoothly Finished Job and is a Pleasing Piece of Architecture

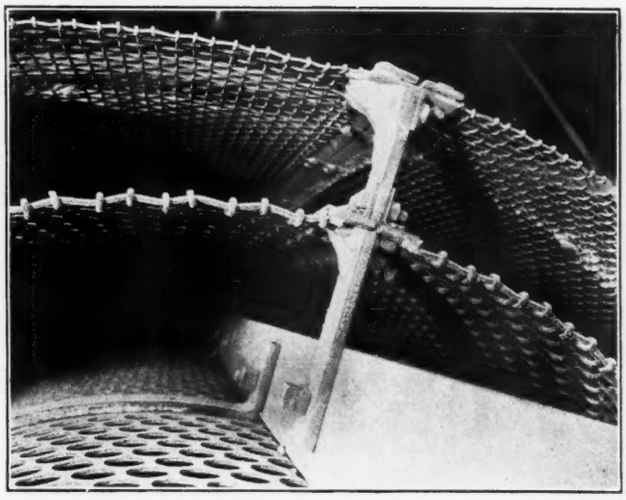
Interior View Showing Bucket Elevators and Steel Work

make available 7/8, 1, 1½ and 2 inch products which can be sold at these sizes or used in the pulverizing plant.

The pulverizing plant is a new feature of the plant. A number 6 Williams Universal mill operated by a 200 h.p. Allis-Chalmers motor produces about 50 tons an hour of a product of which about 90 per cent passes a 20 mesh. The segregation of all material passing the 2½ inch opening of the scalping relieves the secondary crushers of a considerable load and removes the danger of the plants being slowed down at the secondary crushers.

The three secondary crushers discharge to a number 12 Allis-Chalmers style C bucket elevator, 89 feet between centers. This elevator discharges to a battery of two 72 inch by 24 feet Allis-Chalmers closed-in revolving screens which are built on steel frames. The barrels of these screens are fitted with 2½ inch, 2 inch and 1½ inch perforations. Both screens are equipped with 10 foot dust jackets with 1¼ inch perforations. Around these dust jackets there is an outer unperforated jacket which carries the 1 inch material passing through the dust jacket forward and discharges it into either one or two 42 inch by 16 feet cylindrical Stephens-Adamson auxiliary screens below. This arrangement eliminates the large hopper which is

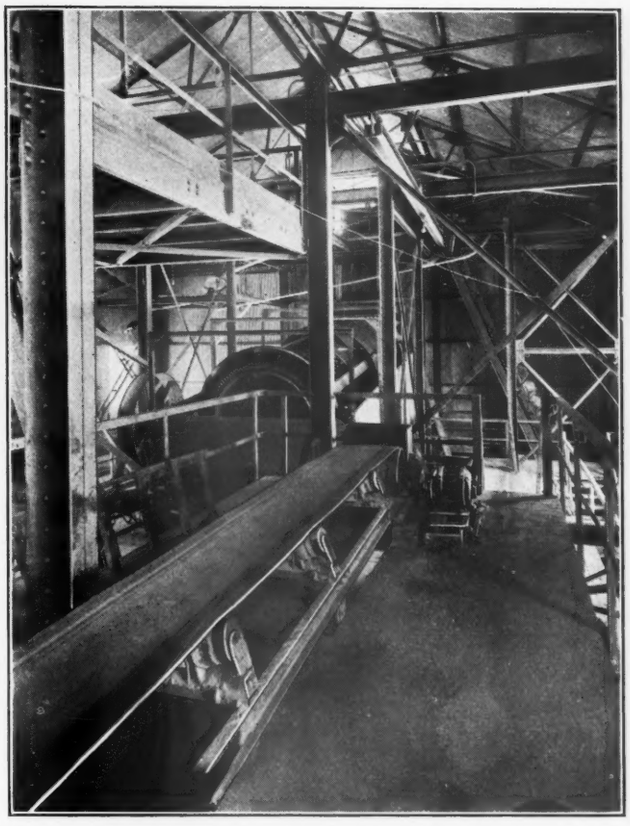
Underneath the Bridge Over Which the Cars are Hauled Through the Plant. All Solid Concrete



Close-Up of the Two Jackets of the Scalping Screen

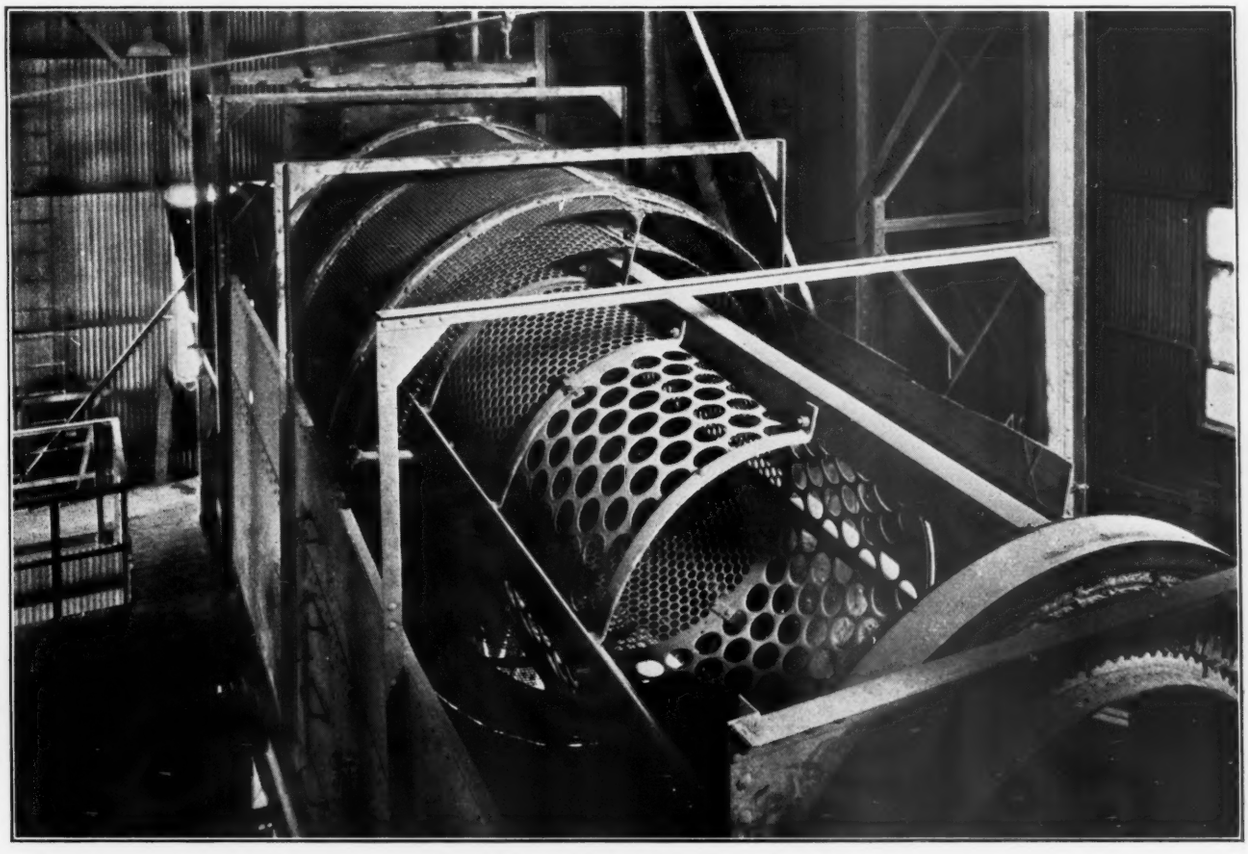
usually installed under revolving screen dust jackets to catch and concentrate the stone for proper delivery to the auxiliary screen. The arrangement saves headroom space. Three sizes of finished stone are produced in this finishing screen arrangement, ½ inch, ⅞ inch, and 1½ inch stone. The ⅞ inch size passes through a steel chute to bins below. The oversize from the larger sizing screens is conveyed back to one of the number 10 reduction crushers by a 24 inch Stephens Adamson belt conveyor. The ½ inch and the 1½ inch sizes are carried to bins by 24 inch and 18 inch Stephens Adamson belt conveyors, respectively.

The 1⅛ inch minus material is taken from the

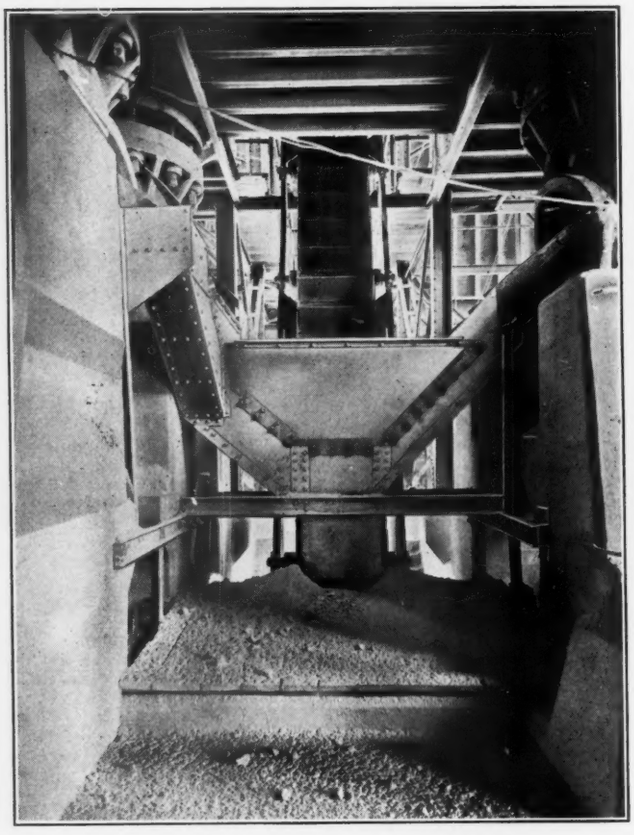


The Return Belt Conveyor for Carrying the Oversize to the Number 10 Reduction Crushers

first pair of sizing screens by an 18 inch belt conveyor and discharged into a steel encased Stephens Adamson chain bucket elevator which in turn dis-



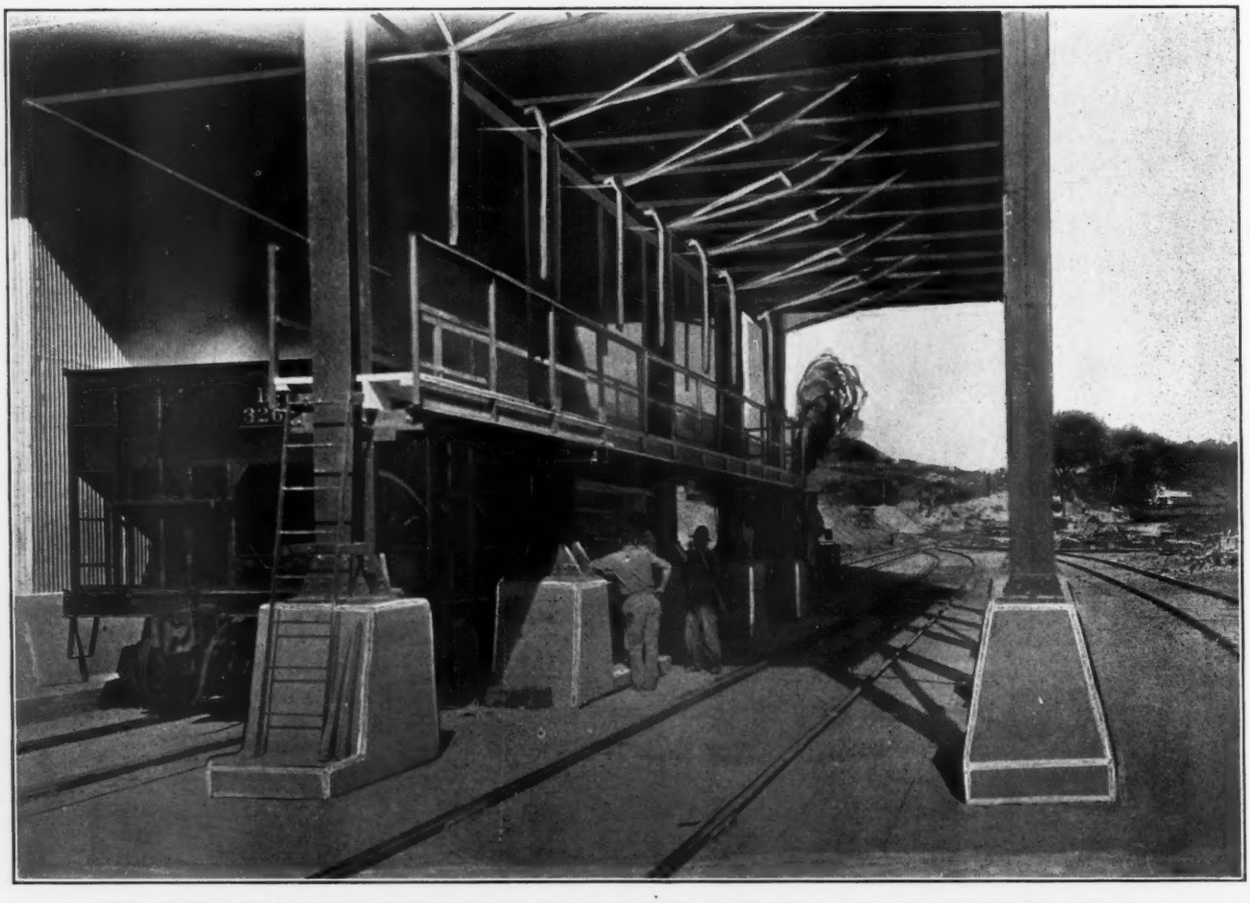
The Scalping Screen 72 inches by 20 feet



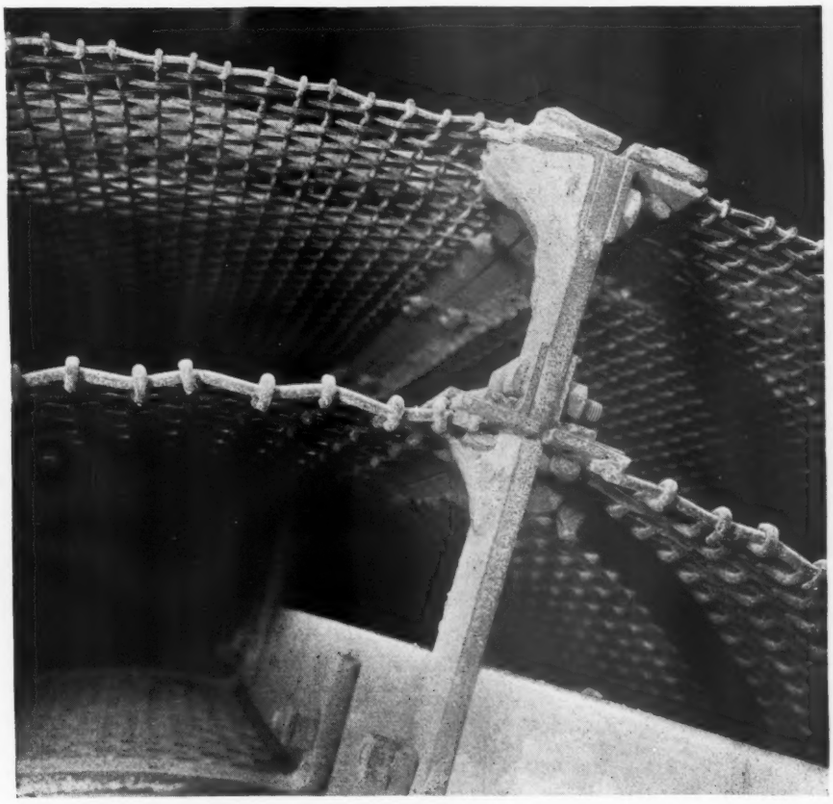
Steel Chutes and Spouts Deliver Stone From Secondary Crusher to Elevator

charges the material into either one of two 18 inch Stephens Adamson belt conveyors. The stone is then distributed by these two conveyors to 4 steel encased Stephens Adamson hexagonal screens, 42 inches in diameter and 12 feet long. Each hexagonal screen is provided with an inner jacket made of wire cloth. This jacket has $\frac{3}{8}$ inch openings for sizing the material. The steel outer jacket reduces the amount of dust and collects the $\frac{3}{8}$ to $1\frac{1}{8}$ inch material at one end of the screen where it falls into a stone box. A steel chute leads the stone from this box to the shipping bins. The material passing through the $\frac{3}{8}$ inch screen is carried to 4 vibrating screens, specially designed by Mr. Glassen. These vibrating screens are provided with two decks, the upper being $\frac{1}{4}$ inch while the lower is 3/16 inch. The material retained on the two screens is finished product while the material passing through the 3/16 inch screen is carried to bins by an 18 inch Stephens Adamson belt conveyor and distributed as $\frac{1}{4}$ inch minus stone. The half inch stone from the vibrating screens is taken to bins by an 18 inch Stephens Adamson belt conveyor. The $\frac{7}{8}$ inch stone from the 4 hexagonal screens is delivered to bins by another 18 inch Stephens Adamson belt conveyor.

The storage bins are built of structural steel on concrete piers and span two loading tracks. There are eight bins and each will hold 150 tons of stone. Each bin is provided with two 20 by 20 inch clamshell bin gates which are operated from an elevated platform supported on the central bin columns. Both loading tracks under the bins are



Two 18 Ton Track Scales Weigh Stone Loaded from Storage Bin Above. All Concrete and Steel Construction



Woven Wire Jackets on Scalper, Quarry No. 1, Columbia Quarry Co.

Photograph taken after screens had been operated throughout one entire shipping season.

The welded-on bolting strips have so preserved the rigidity of the screens that no evidence of chafing is visible at the intersections of the wires.

The special-steel wires are still round in section, and look as good as new—no broken wires or welds, and no distorted meshes.

"Perfect" WOVEN WIRE REVOLVING SCREEN JACKETS have More Holes per Square Foot

And because of scientific crimping, the rasping action of the woven surfaces raises the load as high as 60° to 90° before cascading starts.

Spreading out the load affords multiplied contact with the screen openings, and consequently better screening.

And the segregating action of the long cascade actually separates the finer particles **toward** the screening surface at the peak of the cascade, while the coarser lumps are first to seek the trough of the cylinder, get first chance at the unobstructed openings, pass through instantly if of satisfactory size, and travel faster with the pitch of the screen if too large to pass the openings.

Ask for catalogue No. 47-E

It's a text-book on Woven Screens

THE LUDLOW-SAYLOR WIRE CO.

610 South Newstead Avenue

ST. LOUIS, MO.

equipped with Howe track scales with beams conveniently placed giving the loaders an accurate check on both carload and truckload weights. A 25 ton Davenport locomotive is used to spot cars for loading either for shipment or to outside storage. A special signalling device has been installed to increase the loading efficiency of the bins. This consists of a series of lights so placed that the scaleman can readily see them while attending to his duties. When the scaleman draws the lever to remove material from any bin, a light shows in the bin so that operators above the bin will be warned that stone is being drawn. The lights are also easily seen from the superintendent's office so that he may know which bins are full. Outside storage is used and this material is handled by Link-Belt and McMyler locomotive cranes equipped with Hayward clamshell buckets.

The shipping facilities are unusual. Three trunk line connections are available. The plant is served by the Illinois Central, the Mobile and Ohio and the Missouri Pacific. In addition shipments are also made over the Terminal Railroad having direct connection with twelve additional trunk lines. The standard products distributed include road stone, building stone, ballast, flux stone, rip rap, and agricultural limestone. Columbia high calcium ground limestone is a well known product and the useful literature distributed by the Columbia Quarry Company on the use of this product has often been favorably commented upon. H. C. Krause is sales manager in charge of the marketing of the stone.

The capacity of the plant is rated at 5000 tons per ten hours, but it is operated to produce 4000 tons per ten hours. The normal working force includes between 50 and 55 men. Mr. C. E. Glassen is chief engineer in charge of all mechanical operations. Mr. C. E. Krause is superintendent at the plant. A study of this plant easily convinces one that production costs are less than the average and will be for some time to come because the plant has been built for permanence and over a period of years the tremendous investment will be reflected in profits through a very nominal maintenance and upkeep charge.

The flexibility, completeness and unusual features of this plant combine to make it a property to be proud of. Mr. E. J. Krause is still planning other developments of this property. This year two tunnels, one in each hill at opposite ends of the present quarry, will be opened and stone mined. Mr. E. J. Olsen, a mining engineer of long experience, has been engaged for this development work. The plan is to continue to operate the open quarry in the center indefinitely if desired without in any way interfering with the mining operations at both ends.

The Columbia Quarry Company also operates plants at Valmeyer, Illinois, about 30 miles south of the Krause plant and one at Maystown, Illinois, about 50 miles south of the Krause plant. The plant at Valmeyer is well known for the washing operations. All the product below 2 inches is washed and sold as chemical limestone. The product over 2 inches is sold as flux. A new plant for which all the stone will be mined is to be built here shortly. The new plant will be steel and concrete. There will be a fine grinding plant for reducing all the ⅛ inch minus material. The mine has already been developed to a capacity of 1000 tons per day.

The Valmeyer property covers more than 700 acres made up entirely of hills, which are owned outright. It is a very pure high calcium limestone running better than 98.5 per cent $CaCO_3$. The silica content is less than ⅓ per cent. The property is an excellent one for a mining development. P. G. Forman is superintendent of the present plant and will have charge of the new plant. This development will be one of the most interesting in the crushed stone industry.

In the present operation, Sanderson Cyclone well drills are used and Grasselli powder in breaking up the rock. The stone is loaded into 6 yard cars by a number 32 Marion steam shovel. An 8 ton Plymouth locomotive hauls the cars to the crushing and screening plant. A number 12 Allis-Chalmers and a number 6 Allis-Chalmers crusher handles the stone. The stone is passed through a rotary screen with 2 inch perforations. The oversize is shipped as flux. The minus 2 inch is carried by belt conveyor to the washing plant.

The washing plant consists of a specially designed scrubber and a Stephens Adamson rotary screen with 3/16 inch openings. The material passes from the belt conveyor to the scrubber and then to the screen. Railroad cars pass directly under the washing plant for loading. This present plant will continue to operate with a capacity of about 900 tons per day while the new plant is being built and the tunnels are opened for mining. The change from the present plant to the future plant will be made in not more than a day, so production will hardly be interrupted.

Brazil Has 29,799 Miles of Road

The road mileage in Brazil is 29,799 and is distributed as follows: Rio Grande do Sul, 1,910; Santa Catharina, 3,915; Parana, 3,728; Sao Paulo, 4,324; Matto Grosso, 1,320; Goyaz, 1,640; Minas Goraes, 3,850; State of Rio de Janeiro, 907; Federal District, 124; Espirito Santo, 405; Bahia, 345; Sorgipo, 95; Alagoas, 234; Pernambuco, 1,854; Parahyba, 1,678; Rio Grande Do Norto, 1,235; Ceara, 1,327; and Piauhy, 908. Many of these are dirt roads, but they are marked improvements over the old cart roads.

SOME NORTHWEST FELDSPATHIC MINERALS

By Hewitt Wilson
Consulting Engineer, Bureau of Mines, Northwest Experiment Station
In Cooperation with the Department of Ceramic Engineering, University of Washington

PART I

PRESENT demand for feldspar in the States of Oregon, Washington and Idaho comes largely from the four manufacturers of architectural terra cotta who use feldspar in their glazes. The demand is only about five carloads per year and is met by the Atlantic coast producers of feldspar. In the last few years good grades of potash feldspar near San Diego and Riverside, California, have been mined and ground in commercial quantities for the southern terra cotta and whiteware industries. South Dakota potash feldspar is ground in Murphysboro, Illinois, for the middle west trade. The demand for feldspar in the Pacific Northwest will increase when whiteware companies start operation in the local field. With a population of over 2,000,000 in the three States and the raw materials for whiteware at hand, it is possible that this development will begin in a short time.

A study is being made of the eastern Washington and Idaho kaolins in the ceramic laboratory of the University of Washington at the present time. It is important that the possible sources of feldspar and flint be considered in order to have the three components of a whiteware body. The flint can be most easily produced by grinding the purified quartz sand washed from the kaolins. With two exceptions all of the feldspar deposits thus far discovered in the Northwest are of the soda variety. Some have been studied in some detail, while from others only small samples have been received and the deposits have not been visited by members of this laboratory. A list of the deposits covered is as follows:

1. Deer Harbor, Orcas Island, San Juan County, Washington.
2. Avon, Idaho.
3. Cusick, Washington (Ruby Creek).
4. Ashland and Gold Creek, Oregon.
5. Yale, British Columbia.
6. Douglas Channel, British Columbia.
7. Big Lake volcanic tuff, Washington.

Deer Harbor Soda Feldspar

Feldspar outcrops along the west shore of Deer Harbor on Orcas Island, of the San Juan island group. The deposits lie in the County of San Juan, State of Washington, lot 4, Sec. 7, and lot 1, Sec. 18, Township 36 N., R. 2 W. The main dike lies less than a mile southwest and across the bay from the docks at Deer Harbor. The property belongs to A. D. Tift of Shaw Island.

Description of Deposit

A series of four micropegmatitic dikes have been exposed by erosion at the water's edge in the side of a steep cliff which at this point rises 80 to 100 feet above the water. Two of these dikes are near the southwest entrance of Deer Harbor and the material has a low iron content, while the feldspar of the third dike, situated at the northern end of the bay, contains too much iron for commercial use. The first or smaller dike shows a horizontal exposure of 40 feet, with a maximum vertical rise of about 20 feet and is covered with considerable dark basic material. Eighty feet north of this is dike 2 which continues to the top of the hill at least 80 feet in elevation and has a horizontal exposure of approximately 200 feet. The depth of penetration into the hill is unknown, but material of commercial grade has been found in place on the top of the ledge at least 50 feet from the water's edge. The slope is thinly coated with soil and vegetation which can be washed easily into the bay and thin soil with a growth of fir is found on top. The dike appears to dip 65 degrees northwest and strikes northeast.

Smaller dikes of similar material are found in Sec. 8, T. 36 N., R. 2 W., on the west shore of West Sound, which is a bay lying east of Deer Harbor. An occasional horse of dark basic volcanic rock from the side walls is present in the white feldspar. No large masses of pure quartz, which is often present in feldspar deposits, have been noted and it is believed that the dike will be fairly constant in composition from side to side. These intrusive dikes, according to geological investigations of the University, are of Jurassic age and have penetrated a series of charts of the Devonian or Mississippian periods, and are in contact with a series of contemporaneous dikes of more basic character, called the Turtleback complex.

Composition

The petrographic description and analysis of the soda feldspar is as follows: The soda feldspar is a pegmatite rock, occurring as dikes cutting through a mass of earlier igneous dikes. It is a medium-grained white rock consisting chiefly of albite and quartz with scattered flakes of muscovite, and often shows the eutectoid structure of graphic granite. It is finer grained than typical pegmatite, but otherwise typically pegmatitic. The magma must have been high in volatile constitu-

ents, as is shown by the texture and alteration minerals. The approximate mineral analysis is as follows: 73 Albite; 24 Quartz; 2 Muscovite; 1 Zircon, tourmaline, apatite, magnetite (rare). The common alteration minerals are kaolinite and sericite. The rare alteration minerals are adularia, chlorite and serpentine. Irregular veinlets of quartz are also found cutting the albite. Most of the surface samples contain infiltered iron oxide and large quantities of organic material, which give the rock a misleading appearance. One is surprised at the near-white color which can be obtained by firing such dirty samples. The staining material is burned or readily vaporized when heated.

Chemical and Calculated Mineral Analysis

Chemical Analysis

	Per Cent	Molecular Formula		
SiO_2	75.26			
Al_2O_3	15.26			
Fe_2O_3	1.04			
CaO	0.37			
MgO	1.00	0.094 K_2O		
Na_2O	6.61	0.713 Na_2O	1.000 Al_2O_3	8.384 SiO_2
K_2O	1.33	0.044 CaO	0.0434 Fe_2O_3	0.147 H_2O
Ignition	0.39	0.167 MgO		
	101.26	1.018	Molecular Weight	676.9

Calculated Mineral Analysis

7.84	Potash feldspar
55.86	Soda feldspar
1.83	Lime Feldspar
5.75	Kaolin
28.34	Quartz
99.62	

Sampling and Preparation

Two hand samples were taken from dike Number 1 of the Deer Harbor deposit and from eight different places from the face of the larger dike Number 2. Only one sample (Number 7) after firing proved too dark colored for commercial use. This poor material can be distinguished readily by its brown and green color. Besides the above hand samples which were tested to note the degree of uniformity over the exposed face, a 100-pound sample and a 500-pound sample were taken from accumulated rock fragments which line the base of the slope. The face has been partly cleaned in several places by blasting. The grinding was done in porcelain lined ball mills after a previous calcination to red heat. Off-colored material which would pass unnoticed in the raw condition is often revealed by the heating. The volume change of the minerals, and especially of the quartz, which alters its crystal form on heating, produced a friable structure which disintegrates easily in the ball mills.

Fineness. While the fineness of samples prepared in a laboratory way can vary considerably, the following test will illustrate the degree of reduction. Eighty-five pounds of calcined feldspar were ground for 6 hours with 167 pounds of pebbles in an Abbé mill, 22 inches in diameter and 14¾ inches in width. Of the product 0.5 per cent was retained on the 100-mesh sieve, 0.8 per cent on the 150-mesh and 6.2 per cent on the 200-mesh sieve. In another test a comparison was made with some commercial materials on hand in the laboratory:

Feldspar	Percentage retained on 200-mesh screen	Percentage passing through 200-mesh, and caught by settling 1 minute in water	Total percentage passed through 150-mesh screen
Eastern Canadian	7.7	34.39	42.09
Deer Harbor	5.7	36.6	42.3
California	8.3	48.9	57.2

When lightly calcined and ground, the Deer Harbor feldspar assumes a light pink color similar to some of the Eastern Canadian feldspars because of the oxidation of the iron compounds. The calcination process greatly aided in the grinding and saved an intermediate crushing process. The large chunks, some 8 to 10 inches in diameter, were broken by hitting with a hammer and were then dropped into the mill.

Physical Tests of the Ground Feldspar

The Deer Harbor feldspar shows signs of fusion, such as the slight bending of cones and a glossy surface as low as Orton cone 4. The cones usually reach complete deformation with cone 5. The melted color is opaque grayish white, very similar to the color of some of the commercial feldspars now on the market.

Comparative Deformation Tests of Feldspar with Flint Additions
(Results expressed in Orton cones)

	Eastern Canadian					California						Deer Harbor				
Pct. flint	0	5	10	20	25	0	5	10	15	20	25	0	5	10	15	20
Start of deformation, cone No.	4–5		to	6–7		6	6	6	6	7	7	4	4	5	6	6–7
End of deformation, cone No.	5–6		5–6	8		6		to		8		5	5–6	6	6–7	7

The California feldspar fuses to a more translucent and whiter melt than either the Deer Harbor or the Canadian. The Canadian feldspar showed signs of blistering and gas action when reducing conditions were present in firing. The Deer Harbor feldspar clearly contains quartz, for only 5 per cent can be added without the mixture showing an increase in refractoriness. However, with 20 per cent additional quartz, deformation is finished at cone 7. The deformation period is similar to that of the other two feldspars.

Comparison With Cornwallstone
Chemical Analysis

	Deer Harbor Feldspar	Cornwallstone
Silica	75.26	73.96
Iron Oxide	1.04	1.40
Alumina	15.26	15.90
Lime	0.37	1.89
Magnesia	1.00	0.32
Potassium oxide	1.33	4.34
Sodium oxide	6.61	0.45
Ignition loss	0.39	1.11
	101.26	99.37

Mineral Analysis

Potash feldspar	7.8	25.6
Soda feldspar	55.9	3.7
Lime feldspar	1.8	9.3
Kaolin	5.8	19.9
Quartz	28.3	41.5
	99.6	100.0

Deformation Test

Per cent flint	0	5	10	15	20
Cornwallstone flint mixture:					
Start of deformation (cone number)	7	..	to		9
End of deformation (cone number)	7–8	..	8	8–9	9–10
Deer Harbor flint mixture:					
Start of deformation (cone number)	4	4	5	6	6–7
End of deformation (cone number)	5	5–6	6	6–7	7

While the Deer Harbor material is a soda feldspar and the Cornwallstone has a larger potash content, yet the former has a much lower quartz and kaolin and a higher feldspar content. Cornwallstone has been used in England for generations for pottery manufacture and is even shipped to this country at the present time in small quantities in competition with eastern American feldspar. The iron content of the Cornwallstone also appears to be higher than that of the Deer Harbor.

Soda Versus Potash Feldspar

It is believed that the reason why soda feldspar is not in more common use in the ceramic industry because the available quantity of soda feldspar is small in comparison with potash feldspar, and therefore experimental data and plant research work have not been done to develop soda feldspar bodies and glazes. With the exception of the French porcelains, it appears that the Europeans are not acquainted with soda feldspar. A. S. Watts, one of the authorities on feldspar, is about the only experimenter who has published data comparing the two varieties for use in porcelain bodies. He found practically no difference in the degree of vitrification, warpage and quenching resistance when soda feldspar was substituted for potash feldspar, but did find a difference in the tone of the vitrified ware when tested for "ring" or pitch. The soda feldspar body had a duller or more "wooden" ring. However, Watts states, "Since a soda feldspar porcelain is to all appearances equal in all the above properties to the potash porcelain, it appears to me to offer a means of cheapening the cost of many bodies where this particular quality of sound does not represent any value." In later work, Watts also found that mixtures of soda and potash feldspars soften or deform before the soda feldspar itself when heated in cone shapes and that mixtures of the two feldspars cause greater warpage and shrinkage in porcelain bodies but that the soda feldspar alone does not cause this trouble. On the other hand the translucency increases with soda feldspar up to cone 8. The author believes that soda feldspar is a more active flux than the potash feldspar and is active at a lower temperature, but that the temperature-vitrification range is nearly as long as that of potash feldspar. Staley found that potash gives more brilliant glasses than soda, but nevertheless the soda glasses are more resistent to chemical agencies. Otherwise they appear to be interchangeable in metal enamels with slight variations in the batch composition. Flint in writing specifications for feldspar to be used in glass manufacture makes no distinction between the potash and soda varieties, stating that "the most important consideration in the use of feldspar is that the total alkali be constant and high enough to warrant its use, "otherwise more soda ash must be added."

Costs of Mining and Preparation

Since the dike rises out of deep water with a 10 to 15 foot working ledge at high tide level, the cost of mining and loading onto a barge or scow lying alongside should be a minimum. The rock must be loosened by drilling and blasting and then broken to lumps small enough for a man to handle. By moving the rock only 25 or 30 feet it can be loaded into a barge lying in deep water. Reasonable care should be exercised during loading in eliminating dirty rock and hand sorting should be used at the grinding plant after calcining and before grinding. A large portion of the material used in the tests at the University of Washington for white ware studies was obtained from the loose, unsorted debris picked up from the foot of the cliff. For a plant situated near the water at Seattle the following would be the approximate cost per ton of the lump rock delivered at the grinding mill:

Quarry and loading	$1.50
Boat rate to Seattle	1.25
Unloading	0.50
	$3.25

The cost of grinding should be similar to the costs found in Eastern mills or between $2.40 to $4.90 per ton. The cost per ton will, however, be larger for a small installation. Local demands could be supplied by a small plant which should be so designed that it could be readily enlarged as the demand increases. Recent quotations show the comparative prices of ground feldspar delivered by boat in car lots to Seattle from other points: For ground California feldspar, $30.00 f. o. b. Oakland plus $4.65 freight, or $34.65 per ton, to which must be added the handling charges at the docks; and for ground Eastern feldspar, $18.00 to $21.50 per ton f. o. b. Maine or Canadian mills, plus freight to New York and dock charges and a $9.00 boat rate from New York to Seattle. A profit therefore can undoubtedly be made by the preparation of the local feldspar when the local market is large enough.

PIT AND QUARRY FOREIGN DIGEST

New Method of Providing Complete New Foundations for Old Buildings

1. The introduction of reinforced concrete pressure piles at short distances apart in pairs, generally with one pile on the outside of the wall and the other on the inside, both exactly opposite to each other or as nearly as possible and close to the edge of the foundation stones.

2. The tops of these piles are connected together by a strong reinforced concrete beam for the whole length of the wall.

3. Upon these beams, pre-cast reinforced concrete beams are laid transversely, with their tops a few inches below the bottom of the existing foundation stones.

4. Steel plates and wedges are then introduced and the whole of the foundation thoroughly wedged up.

5. The whole of the voids are then grouted.

6. The walls above the foundations are then sufficiently bored to admit of cleaning out the interstices internally by water under pressure, and then grouting by cement under pressure.

7. Where possible, old mortar joints which have perished are cleaned out, and in some cases stones which have partially slipped out of position are jacked up and treated by cementation.

Anon. (Concrete and Const. Eng. Vol. 22, p. 137-139 (1927).

New Industrial Construction in Soviet Russia

In the current year 14.7 million rubles will be spent for new textile manufacturing buildings and 9.1 million rubles for dwelling houses for workers in the same field. In the metal industry the following has been authorized: 64.8 million rubles for new iron foundries and other metal works, which will be built in South Russia, and employ 13,500 workers. In the South Urals a second great metalurgical plant is under way, which will cost 98.5 million rubles and will employ 9,900 workers. A third installation elsewhere will cost 66.5 million rubles.

The cost of new industrial plants in Soviet Russia in 1924-25 was 385 million rubles, in 1925-26 it was 780 million, and in the current fiscal year 1926-27 will exceed one billion rubles. Anon. (Beton und Eisen, Vol. 26, p. 6. 1927).

Removal of Iron From Clay and Kaolin

Previous to the usual sulphuric acid treatment for the removal of iron from clays, it is found desirable to heat the raw material to a red heat. Its iron content may then be completely eliminated, whereas the unburned clays retain some iron by absorption. The plasticity of the clay is not increased. H. Fleissner (Austrian Patent 104,745).

Portland Cement in Well Tamping

No special cement can be prepared for all wells as the chemical composition of each variety of "bore hole water" is different. The hardening of the cement is arrested by small amounts of mineral tar, gypsum, sugar, gum arabic, soda, tannin, etc., and often more strongly than by larger additions. In practice, it is customary to use ordinary portland cement with the addition of special "catalysts" for each well, in order to neutralize the effect of deleterious substances which retard or arrest the hardening. I. Alexandrow (Petroleum-Industrie 11, 196-199, 1926. From the Russian: Neftjanoe Chozjajstwo).

Researches on Plaster of Paris

The setting of the anhydrous sulphate burned below 300 degrees C. takes place in three steps. 1. The total and immediate transformation of the anhydrous sulphate into the semi-hydrate and the solution of this body up to the saturation point. 2. A pause in which there is no exchange between liquid and solid. 3. Crystallization of gypsum and solution of the semi-hydrate until the first phase is completely transformed into gypsum. Crystallization and setting are simultaneous. It is manifested by an elevation of the temperature of the mass and a decrease in concentration of solution. 300 degrees C. is the maximum temperature which may be used to burn the anhydrous sulphate, because above this temperature another variety of calcium

Calcium Sulphate Cements

In the manufacture of cements by mixing a form of calcium sulphate, a slag or puzzolanic material, and cement clinker, the ingredients are separately completely dried, pulverized and cooled before being mixed. If gypsum is used as the source of calcium sulphate it should be subjected to a series of alternate pulverizing and drying processes until its total moisture content does not exceed 5 per cent. Suitable proportions of the ingredients are 80 per cent of slag or puzzolanic substances, 15 per cent of calcium sulphate, and 5 per cent of cement or cement clinkers. The slag, etc., should be ground to leave a residue of 7/10 per cent upon a sieve of 4,900 meshes to the square centimeter and the calcium sulphate should be more finely ground so that equal numbers of particles of the two ingredients, are present. P. Cadre (British Patent 264, 711).

sulphate is formed which sets only very slowly in water. The presence of the dihydrate (gypsum) accelerates the setting. Bodies which increase the concentration of SO_4 ions accelerate crystallization. Dilute acids which do not give precipitates with calcium sulphate accelerate hydration. The crystallization of the dihydrate is probably accelerated by an accessory crystallization due to impurities. L. Chassevent (Le Ciment Vol. 32, p. 42-48, 1927).

Effect of Acids and Alkalis on Fuller's Earth

Mineral acids have for their main effect on raw fuller's earth the solution of alumina and iron oxide. A spongy formation results with very great surface. Silicic acid does not form a hydrate, but undergoes decoloration. Alkalies act upon fuller's earth, to neutralize the acid products and then to form silicates. The decomposition covers up the empty spaces. Strong alkalies destroy the structure by considerable solution of the silicic acid. F. Weldes (Zeit fur Angew. Chem. Vol. 40, p. 79-82, 1927).

Building Blocks

Interlocking blocks are formed with two rows of pegs on one face and corresponding rows of recesses on the opposite face. They are made up as quarter, half and full sized bricks, the quarter brick having four pegs, the half brick six, and the full brick eight. J. Girlot (British Patent 263,865).

Titanium Sulphate

Titanyl sulphate, TiO, SiO_4, H_2O in fine granular form is obtained by heating, preferably with agitation, a titamin sulphate solution containing from 4 to 12 molecules or more of SO_3 to each molecule of TiO_2 at a specific gravity (tested cold) of 1.5 to 1.75 at a temperature of 90-130 degrees C. or higher. The crystallization may be continued until the TiO_2 in solution is reduced to about 0.5 per cent, when a less acid solution may be added so as to continue the process, provided that the above conditions are still observed. The slat is separated by decantation and washed with sulphuric acid, sulphates such as nitre cake, aluminum sulphate, pure titanium sulphate, etc. The speed of crystallization may be increased by adding some of the previously precipitated salt. The dried salt may be readily mixed with desired substance such as oxalic acid or oxalates. Spence and Sons, Ltd. (British Patent 263,886).

Porous Concretes

Cement, clay, and like products are rendered porous by adding to them when in the plastic state a foam obtained by agitating a solution containing a foam producing agent and a foam assisting agent. The foam-producing agent is a gelatinous material such as glue, albumen, or casein, or a glucoside or saponin containing substances. The foam assisting agent in a natural or artificial resin, a resinate or resinic acid, a cellulose derivative, rubber, glycerol or a phenol. Formalin may be added to either ingredient. A foam of increased stability results if made in the presence of chloroform vapor. J. A. Rice (British Patent 263,571).

Weighing Concrete Ingredients

An apparatus for weighing cement and water in the requisite proportions for delivery to a concrete mixer comprises receptacles respectively for cement and water operatively associated with a balancing mechanism, a valve-controlled conduit for supplying water to the water receptacle, means controlled by the balancing mechanism for closing the valve when the receptacles reach a balanced relationship providing any desired predetermined ratio of water to cement, means for adjusting the balancing mechanism so as to vary the ratio of water to cement, and means for discharging the contents of the receptacles into the concrete mixing apparatus. J. G. Aglers. (British Patent 263,-797).

Lime Kilns

In a shaft kiln for burning lime, cement, etc., the air for combustion and cooling is introduced partly into the clinkering zone and partly at one or more lower points in the kiln. The air from a fan is delivered to the space beneath the crushing rollers, and through rings and nozzles through the cooling and clinkering zones. The air may be heated in separate air heaters, or in the walls of the kiln, and may be supplied at high pressure. The kiln tapers downward from the clinkering zone towards the rollers, and the hottest portions may be water cooled. The air supply conduits may be helically arranged around the kiln, and means may be provided for regulating the supply of air. A. Andreas. (British Patent 263,166).

Ball and Ring Mills

In a grinding, pulverizing, mixing, and separating machine of the type in which a shaft rotates a carrier plate, spider or arms to which is attached one or more roll-heads, pushers, balls, or other suitable grinding heads which crush, grind or mix the materials against a ring or die, resilient means are interposed between the driving-member and the grinding head or similar device and carries or supports the head and gives it a positive directional drive. The resilient means may consist of one or more springs of laminated or leaf type secured to the driving-shaft of the machine and to which the grinding head or similar device is attached. D. J. Rees (British Patent 264, 324).

Production of Magnesite During 1926

The production of crude magnesite in the United States in 1926 was 133,500 short tons, valued at $1,200,830, according to statistics compiled by J. M. Hill, of the Bureau of Mines, Department of Commerce. Four operators at 5 mines in 4 counties in California produced 53,940 tons of crude magnesite, valued at $604,130; all of them reported only fair business due to foreign competition and lower prices on all products. All of the output in Washington was from the mines of the Northwest Magnesite Co., which operated 2 of its 6 furnaces at Chewelah, Stevens County, part of the year.

Magnesite Supply in the United States, 1921-1926, Expressed as Crude Magnesite, in short tons.

Year	Domestic	Imported	Total[1]
1921	47,904	65,569	113,473
1922	55,790	217,861	273,651
1923	147,250	151,092	298,342
1924	120,100	148,700	268,800
1925	120,660	142,283	262,943
1926	133,500	196,318	329,818

[1]Prior to 1924 a factor of 2 tons of crude to 1 ton of calcined was used in expressing imports as crude magnesite. Since 1924 the factors used are 2 to 1 for imports from Italy and 2½ to 1 for other imports.

Sales of magnesite of domestic origin in 1926 were 1,540 tons crude, 18,580 tons of caustic calcined (a decrease of approximately 22 per cent as compared with 1925), and 42,540 tons of dead-burned (an increase of 46 per cent as compared with 1925), having a total value of $1,703,490.

Imports of magnesite in 1926, according to Bureau of Foreign and Domestic Commerce, were 608 short tons crude, valued at $6,555; 14,830 tons of caustic calcined, valued at $330,131, over half of which came from India; and 77,108 tons of dead-burned, valued at $1,128,823, practically all of which was from Italy. Corresponding figures for 1925 were 4,478 tons crude, valued at $57,185, most of which came from Italy, 17,019 tons of caustic calcined, valued at $412,186, nearly 60 per cent of which came from India, and 47,620 tons of dead-burned, valued at $703,273, over 99 per cent of which was from Italy. It is interesting to note that a few tons of crude and caustic calcined magnesite was imported from Kwantung, China, in 1926.

Prices

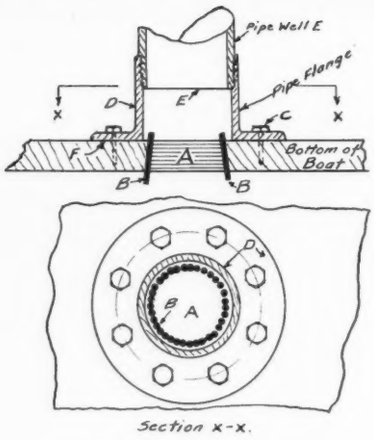
Quotations on crude magnesite during 1926 were $14 a ton. California Grade A, caustic calcined, ground 80 per cent through 200-mesh, was quoted at $40 to $42 a ton in January and February, $38 to $42 in March and April, $45 in May, $40 in June and July, $44 in August and September, $45 in October, $42.50 in November, and $40 in December; the Grade B was $38 throughout the year. Dead-burned was $40 a ton at the first of the year, but from February to August was quoted at $35, and since September at $33 a ton eastern seaboard.

Domestic producers reported sales of crude magnesite at from $7.50 to $12.65 a ton, f.o.b. shipping point of mine, the average price for all magnesite sold crude being $11.32 a ton. Producers of caustic calcined magnesite in the United States reported sales at from $20 to $40 a ton, the average price for the total sales of domestic being $32.10 a ton. Domestic dead-burned magnesite was sold at from $25 to $46 a ton, the average price for the entire output being $25.62 a ton, f.o.b. shipping point.

How to Cut a Well Hole In Wooden Hull Boat While Afloat

On sand diggers, and other river craft of a similar nature, it is sometimes convenient to have a well with an opening through the bottom of the hull, through which oversize and other material may be discarded back to the river. This well may consist of a ten or twelve inch pipe screwed to a flange which is in turn bolted to the bottom of the boat. A circular hole is cut out of the bottom between the walls of the flange, allowing the water to rise in the well to its outside level. The well must of course be encased to a convenient point above the level of the water when the boat has its maximum displacement.

It is a simple matter of course to install this well when the boat is on the ways or in dry dock. However, the need for it presents itself in most cases after the boat is launched. Then it becomes necessary to put the boat in dry dock, or adopt some other method. Any selection of method must take into account the danger of sinking the boat should something go wrong when the hole is being punched through the bottom of the boat while it is afloat.



Illustrating Method of Cutting Well Hole

The following method, indicated by the accompanying sketch, was successfully used by Samuel R. Puryear, of Nashville, Tennesee, in installing a pipe well on the sand digger of the Ohio River Sand and Gravel Company at Paducah, Kentucky. The boat had a wooden hull, and less than one gallon of water leaked through the bottom during the operation of cutting the hole. The method applies only to the case of a wooden hull.

A circle was first described on the bottom at the point selected for the hole, and of a diameter equal to the size of hole desired. Then a series of abutting holes were bored on this circle. When the bit was withdrawn in each case, a soft pine plug B, prepared in advance, was quickly driven into the hole made by the bit. These holes were bored at a slight angle outward, so that when all were completed and plugged the result was a big plug A, held in place against the pressure of water by its wedge shape.

The pipe flange D was then centered over the series of plugs and fastened to the bottom with lag screws C, with a heavy gasket F between the flange and the bottom of the boat. The pipe E was then screwed to the flange and carried up to the elevation desired above the water level.

The operation was then completed with the exception of removing the plug A. This was done by carefully centering a heavy railroad rail about ten feet long vertically in the pipe, and then letting it fall. The impact against the plug A was sufficient to dislodge it without damage to the flange connection, and the rail fell to the bottom of the river.

Domestic Supply of Magnesite in Various Forms in 1926

Class	Sales (domestic) Short tons	Value	Imports Short tons	Value	Total Short tons	Value
Crude	1,540	$ 17,440	608	$ 6,555	2,148	$ 23,995
Caustic	18,580	596,370	14,830	330,131	33,410	926,501
Dead-burned ..	42,540	1,089,680	77,108	1,128,823	119,648	2 218,503

INTIMATE NEWS OF MEN AND PLANTS

Pennsylvania Asbestos Co. Organizes Cuban Unit

The Asbestos Shingle, Slate & Sheathing Company, of Ambler, Pennsylvania, announces the incorporation under Cuban laws of the Ambler Asbestos Company of Cuba, with its home office in Havana, to handle the sale in Cuba of corrugated asbestos roofing, asbestos shingles and tile and other asbestos building materials manufactured by the Asbestos Shingle, Slate & Sheating Company.

Dr. R. V. Mattison, president of the Asbestos Shingle, Slate & Sheathing Company, is president of the Cuban company; Mr. Royal Mattison is 1st vice president; and Mr. Robert J. Lewis, who has been manager of the Cuban business of the Asbestos Shingle, Slate & Sheathing Company, is 2nd vice president.

Organization of the Cuban company was made necessary by growth of the company's export business in Cuba, according to Mr. Ralph E. Frey, sales manager of the company, who recently returned from a trip to Cuba, and is part of a general expansion program that includes the construction of a new factory at St. Louis to handle the western business of the company.

Giant Portland Cement Co. to Rebuild

According to a report another mill to be almost entirely rebuilt and modernized is the Reliance mill of the Giant Portland Cement Company, steam giving way to electricity. The improvement began in 1920 with the building of a modern crushing and storage house. A new dryer, eight feet in diameter and eighty feet long, with an hourly capacity of fifty-five tons, was installed. Two large pulverizing mills, electrically operated, replaced a dozen small mills. Their product is delivered to a large steel bin. Under the steel bin is placed a mixing or blending conveyor. Screw conveyors then take the product to the tube mills. Through other conveyors the product is delivered to a steel elevator feeding the kiln boxes. From the six kilns, 125 feet long, the clinker is sent into an open clinker storage, served by a traveling crane with a three yard bucket and having a runaway of 720 feet in length with an eighty foot span.

In the clinker grinding mill, two electrically operated gear driven mills have replaced a score of small grinding mills and crushers. The preliminary ground material from these mills is conveyed and distributed into large steel bins serving four tube mills. A new silo stockhouse was built early last year. It consists of twelve concrete silos, twenty-six feet in diameter and eighty feet in height, these being in four rows of three silos each. They receive the cement from the tube mills and deliver it through conveyor to the pack house. A dust collector system was installed in the clinker grinding department.

The work involved in the changes was performed under the direction of O. D. Havard, general superintendent, and D. C. Findlay, industrial engineer.

A spiral meter, invented by Mr. Havard, mechanically adding gypsum during the manufacturing process, is in use at the mill. The meter operates a worm gear train which actuates a make-and-break contact device, lighting a lamp every time ten barrels of clinker has passed through the feed spouts. This furnishes the signal to add gypsum, which is performed mechanically by the starting and stopping of a small gypsum conveyor, actuated by the impulse from this contact maker, discharging a definite amount of gypsum on the feed table of the mill itself.

Seven Quarries Merge

We are informed that six companies, operating stone quarries near Carthage, Missouri, recently consolidated to form one company with total assets of $5,000,000, the new company to be known as the Carthage Marble Corporation. The stone quarries included in the merger are the S. W. Steadley and Company, the Spring River Stone Company, the Carthage Marble and Building Stone Company, the Carthage Marble and White Lime Company, the Ozark Quarries Marble Company and the Lautz Missouri Marble Company.

The president and general manager of the merger will be K. D. Steadley, a member of the Steadley firm. George J. Busboom, president of Busboom Brothers Construction Company, of Fairbury, Nebraska, will be vice president and secretary; W. E. Carter, cashier of the Bank of Carthage, treasurer; B. L. Van Hoose, director, and H. F. Mills, sales manager. A large sales force will be created at once to cover the United States and Canada. H. F. Mills, of Kansas City, will be the sales manager of the corporation. T. E. Taylor, formerly a salesman of the Steadley quarry, will be one of the members of the enlarged sales force. B. D. Bensing, superintendent of the Steadley quarry, will be general superintendent of the new corporation.

Five of the six companies in the merger have owned and operated a quarry each. The Consolidated Marble & Stone Company operated two separate plants, one north of Carthage and the other located on Center Creek where a quarry of the Carthage Marble & Building Stone Company is also situated. Other quarries are located north of the city near Spring River. Geological engineers estimate that 229 acres of the 495 acres coming under the control of the new corporation, are composed of rich stone land. They claim that sixty acres of the land contains enough marble to operate all plants of the company at the present rate for thirty years.

Equipment of the combined plants includes 30 channelers, 55 gang saws, eleven traveling cranes, twenty derricks, eight diamond saws, fifteen rubbing beds, twelve planers, nine air compressors, eight water pumps, nine lathes and nine air line systems.

U. S. Gypsum Promotes Croswell and Davis

We are informed that Harry V. Croswell, who has been general manager of the United States Gypsum plant at Batavia, New York, for several years, has been promoted to the position of manager of the mines and transferred to the main office at Chicago of the United States Gypsum Company. J. R. Davis, formerly works manager of the plant at Gypsum, Ohio, will succeed Mr. Croswell.

Consumers Add New Unit

The Consumers Company have built a new recrushing building at their McCook plant at La Grange, Illinois. The equipment consists of three Allis-Chalmers number 6 McCully reduction crushers, a Stephens-Adamson belt conveyor and pan conveyor, two Allis-Chalmers revolving screens and four Universal vibrating screens.

Powhattan Mining Corp. Produces Excellent Asbestos

The Powhatan Mining Corporation of Baltimore, Maryland, secure a very high grade asbestos at their Pylesville pit which is largely used for filtration in chemical analysis. This particular type of asbestos is of the Octinolite or Tremoline variety of the so called amphibole group. It is practically free from iron and is able to resist acids and extreme temperatures and shows almost no loss on ignition. A new stiff derrick with a clamshell bucket has been installed at the Pylesville pit.

The officers elected recently include Fred. A. Mett, president, Charles Silver, vice-president and secretary and Elmer L. Farley, treasurer. The board of directors consists of Fred A. Meet, Samuel W. Wiley, Charles Silver, Elmer L. Farley, A. S. Rome and Frank H. Meet. J. C. Kempvance, Jr., is sales manager.

Harris Granite Quarries Improve Plants

During the past winter the Harris Granite Quarries Company of Salisbury, N. C., made a number of improvements at their different crushing plants. They changed the screening arrangement at the Stacey plant increasing the capacity 150 per cent. Four additional cars were also added to the bin capacity of this plant.

A small local crushing plant for crushing up accumulations of granite waste has been built at the Balfour plant. The American plant has been completely electrified and a new Symons cone crusher installed. This new crusher has increased the capacity of this plant on the larger sizes of crushed stone and also greatly increased the output of 1 and ¾ inch sizes.

Tri-O-Lite Products Company Increases Plant Capacity

The Trio-O-Lite Products Company producers of diatomaceous earth at Vivian, Nevada, are specializing in high temperature insulation products and are making some noteworthy improvements in the mine and mill. These changes concerning the cutting out of the material, storage, handling and the refining methods at the mill.

Two new products are now being marketed and the plant capacity has been increased. Future developments will include additional storage facilities for the mine run material before it enters the dryers. Additions to the housing facilities will also be made.

Great Lakes Cement to Start Production June 1st

We are informed that the New Great Lakes Portland Cement Company's plant at Buffalo, New York will be in operation not later than June 1st. The Federal Portland cement plant, being built south of the Lackawanna steel plant, also will be in operation soon. The former will produce 7000 barrels a day, and the latter 3000 barrels a day.

The Great Lakes plant will use as raw material shale dug from its own property south of Buffalo, combining it with limestone brought in from Michigan. The Federal company will use slag obtained from the Lackawanna plant instead of shale.

Cooper Crushed Stone Co. Ready for Business

It is reported that the installation of modern machinery whose cost exceeded forty thousand dollars has been completed at the West Nanticoke plant of the Cooper Crushed Stone Company, Wilkes-Barre, Pennsylvania. Production will reach four hundred tons a day and the quality has been approved by the Pennsylvania Highway Department for use by contractors on state highways. George P. Cooper is president and general manager.

A. C. O'Laughlin Working Down

A. C. O'Laughlin Company are working the pit down to a 40 foot depth at their Bellewood, Illinois, plant. They have recently installed a Foote speed reducer for the revolving screens with a speed reduction of 12½ to 1. A new Universal screen with a new style steel frame has also been installed.

Southwestern Cement Elects F. H. Powell President

Mr. F. H. Powell has been elected president of the Southwestern Portland Cement Company. Mr. Powell succeeds Mr. Carl Leonardt whose death was recently reported in Pit and Quarry. Mr. C. C. Merrill was elected vice president and general manager at the same time. H. C. Swearingen, sales manager at the El Paso plant passed away on March 11.

Federal Stone Digs Deeper

The Federal Stone Company are extending their deposit about ten feet deeper at La Grange, Illinois. A new Standard track scale is being installed at the plant.

Keene's Cement Co. Expands

During the past few months the Bert Brothers Keene's Cement Company has doubled the finishing capacity on Keene's cement. This is not due so much to any sudden increase but largely to the steadily increasing demand during the past four or five years which has finally reached and passed the full capacity of the finishing mill.

Additional facilities have been provided to take care of the increased demand for the next few years. Additional reinforced concrete storage bins with a capacity of several thousand tons have also been finished.

Solvay Process Enters Field at Moline, Kansas

The Solvay Process Company are rebuilding the plant at Moline, Kansas, which has been idle since 1921. The new plant will have a capacity of 2000 tons per day. In addition to stone for the Solvay Process Company, production will be made for the commercial field. H. J. Pearce is in charge of operations at Moline.

Riverside Lime and Stone Adds Two New Kilns

Riverside Lime and Stone Company at Lyons, Illinois, have added two Keystone kilns making six kilns in all. The two new kilns are the same size as the other four. A new 8 ton Plymouth locomotive has just been placed in operation.

Columbia Sand and Gravel Completing New Plant

The Columbia Sand and Gravel Company are completing a new sand and gravel plant in the southeast section of Washington, D. C., which will be ready to produce 200 tons per hour by May 15th. W. H. Jordan is engineer for the company.

New Chicago Office Opened by Manganese Steel Forge

W. H. Porter has opened the new Chicago branch office of the Manganese Steel Forge Company at Room 1335 in the Old Colony Bldg. Mr. Potter has spent considerable time at the plant and home office in Philadelphia before coming to Chicago. Other branches are maintained in New York, Pittsburgh, Detroit and Los Angeles.

Forest Lawn Granite Works, Saginaw, Mich. $5,000.

Hoadley Brothers, Inc., Bloomington, Ind. $200,000. John W. Hoadley, Albert T. Hoadley, Dovie F. Hoadley. Stone.

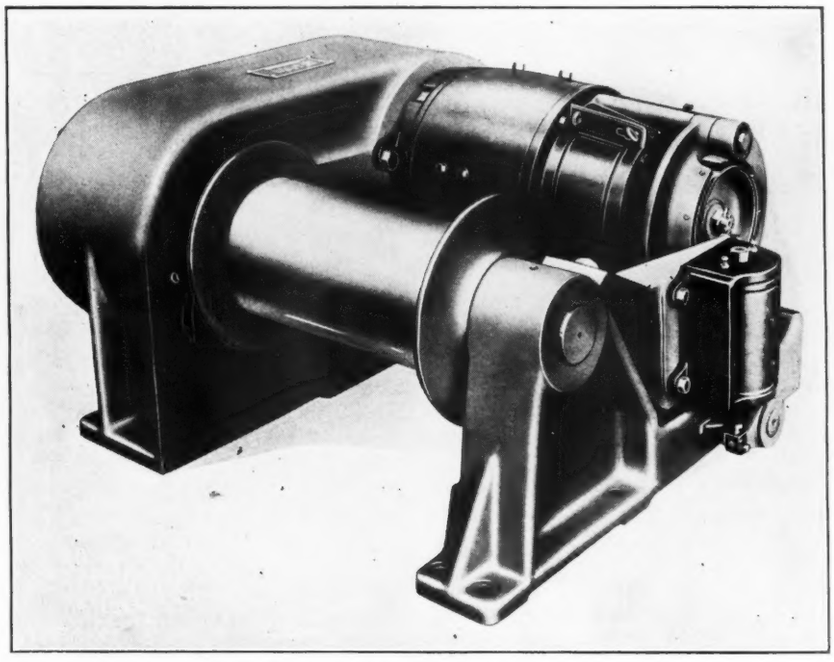
Climax Appoints Hunter

The Climax Engineering Company has appointed the Hunter Machinery Company, of Milwaukee, Wisconsin dealers in Climax engines and power units. Agreements have also recently been made with the Belknap Hardware and Manufacturing Company, Louisville, Kentucky, by which this organization will handle the sales of Climax engines in Kentucky, Northern Tennessee, West Virginia and portions of Virginia and North Carolina. Woodward-Wight and Company, New Orleans, Louisiana, are dealers in Climax engines for Southern Louisiana and Southern Mississippi.

Steel Bins for Trap Rock

An interesting and valuable booklet on Steel Bins for Crushed Trap Rock has been issued by Davis and Averill, Inc., engineering specialists in the production of such units for the rock products industry. The booklet carries the fundamental message of the value of retail distribution for the rock quarry, with adequate facilities for rendering real service to such trade. No less authority on this subject than Mr. Albert L. Worthen, Vice-President and General Manager of the Connecticut Quarries Co., Inc., New Haven, Conn., presents his views on this subject from practical knowledge and experience under the caption, "Crushed Trap Rock—In Any Amount—In Any Size—At Any Time," and one-half of the booklet is given over to his story in the form of an interview.

The remainder of the booklet describes the different steel bins units, which are of circular type, and also, steel bins of square or rectangular character for aggregates. It concludes with a brief reference on conveying machinery for bin service. This booklet is 5½x7¾ inches in size, well printed on good paper, with substantial cover. It is profusely illustrated.



The New Lo-Hed Electric Hoist

New Lo-Hed Electric Hoist

A new Lo-Hed electric hoist that can be mounted in a fixed position, either overhead or on the ground, or can be placed on skids and used as a portable hoist is announced by the American Engineering Company. The standard machine consists of a smooth drum, driven by a motor through a train of spur gears, all mounted on a common bedplate. It is furnished in sizes for handling loads from 500 to 4500 pounds.

The motor and gears are completely enclosed. Gears are of drop forged steel, heat treated and run in an oil bath. Hyatt high duty roller bearings are mounted on the ends of all gear shafts and the cover of the gear case is easily removable. The drum has large flanges which prevent the rope jumping the ends and give maximum stowage capacity. One bearing of the drum shaft is lubricated by splash from the gears and the other by an Alemite fitting. The motor is a fully enclosed, ball bearing motor, especially designed for hoist service. Either D. C. or A. C. motor can be furnished. The controller is of the single speed, reversing drum type. When desired, various modifications in the hoist can be made such as supplying grooved drums, air motors or steam motors, push button and remote control, holding and lowering brakes, extension shafts with additional heads, etc.

New Flow Meter Company

A new company known as the Bailey Meter Company on April 1 acquired the flow meter business and patents of the General Electric Company and the fluid meter and combustion control business and patents of the present Bailey Meter Company.

The engineering, manufacturing and sales organization of the present Bailey Meter Company will be retained by the new company, with the increase in personnel necessary from the General Electric Company to handle properly the additional business. The new company will have its factory and general offices in Cleveland, Ohio.

E. G. Bailey, president of the present Bailey Meter Company, will be president of the new company. R. S. Coffin, vice president of the present Bailey Meter Company, will be vice president in charge of administration and finances. R. E. Woolley, now connected with the General Electric Company, will be vice president in charge of engineering and sales.

Lincoln Electric Company Changes Personnel

G. N. Bull, formerly with the Worthington Pump & Machinery Company, has been made district manager of the New York office of the Lincoln Electric Company. C. S. Freeman, formerly in charge of the Lancaster office, has been transferred to the Buffalo office and made district manager. S. W. Shultz, formerly of the Philadelphia office, has been put in charge of the Lancaster office. Ed. J. Pfister, formerly of the Buffalo office, has been transferred to the Philadelphia office.

L. B. Foster Company Opens New Chicago Office

The L. B. Foster Company, distributor of steel rails and complete track equipment, has opened offices in the Illinois Merchants Bank Building, Chicago. Adequate warehouse and storage yard facilities have also been provided and plants for the housing of fabricating and reclaiming machinery are in process of erection, so that a complete service can be had, and shipped, from this point. The Chicago office will be under the management of Reuben A. Foster, vice president of the firm.

New Gas Electric Locomotive

At Davenport, Iowa, on April 5th, the Davenport Locomotive Works tested their new gas electric locomotive before about two hundred people. The demonstration was with a 10 ton machine hauling 190 tons on a ½ per cent grade. After the successful demonstration the party inspected the plant and had lunch as the guests of the Davenport Locomotive Works. Mr. E. Parmby was in charge of the affair.

The new Davenport gas electric locomotive was built as a result of the demands for a machine with power equal to steam, flexibility and elimination of mechanical clutch and gear transmission. The manufacturers claim that the Davenport gas electric locomotive will start a heavier train, and in switching service will handle more ton-miles per day than any steam or gasoline locomotive of the same weight.

In principle, a generator connected directly to a gasoline engine furnishes electric current for electric motors that are applied to each axle, all the wheels being drivers. Power and speed are regulated through a controller, as in a street car, and the speed can be varied instantly for starting heavy loads, and it is impossible to stall the engine by such overload. Instant starting, smooth acceleration and close speed regulation are obtained with these engines. This new type of motive power is the most advanced step in locomotive construction ever produced.

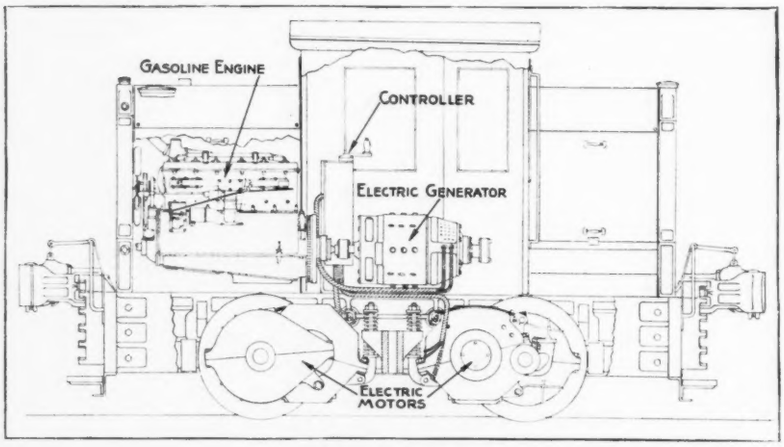
Davenport gas electric locomotives are made in 8, 10, 12, 16, 20, and 24 ton sizes for all track gauges. The three smaller sizes have four wheels, and the larger sizes have two four wheel trucks. The accessibility is one of the features. The machine is assembled in units, and in cast of accident individual parts can be replaced in the field. It can be serviced by any one familiar with a gasoline motor or any one familiar with electrical equipment. Any mechanic can remove and replacee any part which means uninterrupted service.

The gasoline engine as a basic power has ample capacity in excess of requirements at all speeds. It is impossible to stall the engine by overloading. The full capacity is always available. The standard equipment includes electric starter, air cleaner, governor. Heavy duty, amply designed motors are used. The control is so arranged that no abnormal voltage can be developed. There is a minimum wear because of few moving parts. There is no wear and replacement or adjustment of clutch plates, and no transmission, bevel gears, shafts or chains to break.

The electric power equipment is manufactured by General Electric Company, composed of generator, controller, and heavy-duty motors, ample in capacity and of proven practical design. Constant, dependable power is available to meet all conditions. There is an unlimited number of speeds as high as 35 miles per hour and no gears to shift.

The machine has a maximum tractive effort for total weight and equalized distribution of weight. There is continuous even flow of power at all speeds. Full power is instantly available for starting heavy loads, with instant starting and smooth acceleration. Correct engineering design has been applied and standard proven materials have been used, with over size equalized brakes, semi-elliptic springs, cross equalizer giving three point suspension, self adjusting for all varying conditions.

The control is centralized, one hand for control, one hand for brake lever, foot accelerator. There are no transmission gears to shift. The cab is in the center giving the best vision for the operator. The machine can be used also as a portable electric power plant. The power unit will develop up to 240 volts. Wires are attached to removable plug in the cab for such purpose.



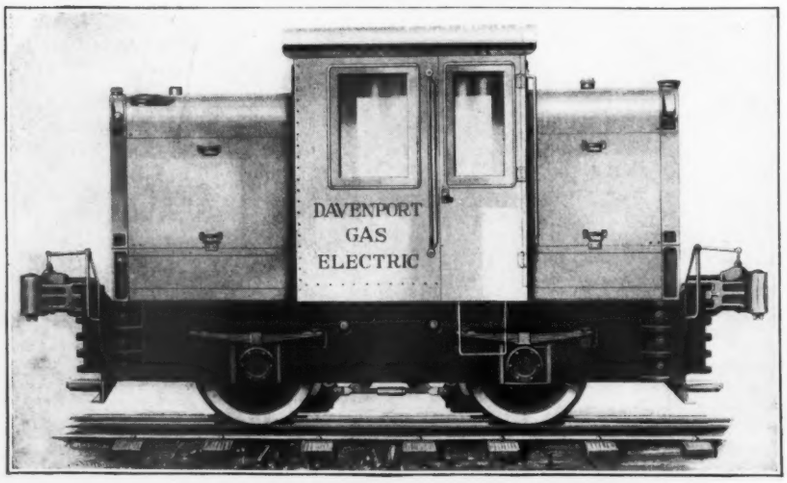
POWER+PLUS

NO TRANSMISSION **NO CLUTCH**

DAVENPORT

GAS—ELECTRIC

INDUSTRIAL LOCOMOTIVES



8-10-12 Ton Sizes

Illustrating the New Davenport Locomotive

New Incorporations

Holliston Trap Rock Co., Milford, Mass. $100,000. Frank P. Decrew, Leslie A. Eames, Holliston, Mass.; Abraham Rosenfeld, Benny Rosenfeld, Milford, Mass.

L. D. Tocci Granite Co., Inc., Quincy, Mass. $12,000. Henry C. Smalley, Angus D. Martin, Loretto D. Tocci.

Sumter Lime Rock Co., Orlando, Fla. $10,000. Charles S. Stewart, Fred S. Scott, E. Stewart.

Superior Earth Co., Orlando, Fla. C. C. Ruprecht, 211 Grace St.; L. R. Cambron, Autery Arcade; J. H. Gardner.

More & More Sand & Gravel Co., Vernon, Tex. $20,000. R. L. More, R. L. More, Jr., C. W. More.

Link Belt Company Issues Sand and Gravel Booklet

The Link Belt Company in book Number 540 describes the equipment which it manufactures for use in the preparation of sand and gravel by the washing and sizing process. The advantages claimed for the Dull inclined conical screen are namely: The materials are fed into the large end of each screen and travel toward the small end; The large end has more perforations, more wearing surface and is equivalent to a much larger screen. It therefore has greater efficiency, requires less power and has smaller upkeep expense; The screens have longitudinal joints and can be dismantled from the shaft without disturbing the shaft. Walk ways are also provided on both sides of the screens, to make them accessible.

This type of screen can be placed low in height thus requiring less timber for supports. It is made in four different sizes, depending on the capacity required and the nature of the material. Pipe nozzles are placed at the discharge end of the screens, for injecting fresh water to rinse off the dirty water and fine sand from the larger gravel. This fresh water also prevents the material from discharging too rapidly and carrying over some of the fine particles.

The sand, water, soils and impurities are discharged from the last screen into the sand separator. The sand settles to the bottom of the tank, and the water, carrying the impurities, passes over the opening at the top of the tank and is carried away by a launder. The sand is discharged automatically at the bottom of the tank. A water pan is usually furnished with the screens. These pans are placed beneath the screens to catch the water and materials and sluice them forward to the next screen, or to the sand separator.

The preliminary scrubber is a solid cylindrical shell, with internal retaining rings dividing the length into four compartments, which retard the progress of the materials through the scrubber while lifting vanes raise and drop the material into a bath of water. This type of scrubber is mounted on a center shaft which is coupled directly to the screen shaft, forming a continuous shaft. The usual driving gears are then placed on the scrubber shaft to drive the entire set. When larger capacities are required a larger type of scrubber is used. This scrubber has a similar set of rings and lifting vanes, but it is not mounted on a center shaft. The shell is bolted to heavy angles with receiving and discharge end castings. The whole unit is then mounted on a frame and revolves on trunnions at one end, while a heavy stab shaft supports it at the other end.

Other types of screens, manufactured by this company, are illustrated in the book. These are horizontal conical screen, and standard cylindrical screen. Loading spouts and gates of several types and sizes are described. This company also manufactures dragline cableway excavators and the correct operation of this machinery is noted at some length both by text and illustrations of installations. Other details used in the preparation of sand and gravel such as belt conveyors of several types, troughing idlers, bucket elevators, digging elevators, sprockets, buckets, chains, apron conveyors, vibrating screens, etc., are also described. At the end of the book several illustrations are given of sand and gravel washing plants showing the application of Link Belt equipment which helps to make this catalog not only valuable but also interesting reading.

Eickhoff Shaker Conveyor

The Conveyor Sales Company, Inc., has issued a catalog describing the Eickhoff ball frame shaker conveyor for which they are the sole American agents.

The ball frame consists of a combination of angles arranged so that they form a housing on each side of the frame. In each of these housings two balls are placed which carry the top angle of the housing allowing it to move freely to and fro. The dimensions of the angles and the balls are so gauged that the angles do not touch each other. The vertical side of the bottom angle is turned over the horizontal side of the top angle so that the latter cannot be removed in an upward direction. Both angles have studs riveted to the ends and in the middle which prevent the balls moving too far and at the same time limit the motion of the top angle to either side.

With the construction used on this frame there is no sliding friction as the balls touch the sides of the housing at one point only. At the same time the balls keep the two angles sufficiently wide apart to prevent contact between the angles. A subsequent moving of the ball frame, when the plant is in motion, cannot take place as the design of the connection between the frame and the troughing keeps it in position. Dirt and dust is prevented from entering the inside of the ball frame as the ball race is protected by the top angle.

The conveyor can be operated by any type of compressed air engine or electric drive. However, when using a compressed air drive a single acting engine with an auxiliary cylinder acting as a spring at the opposite end of the conveyor is recommended. These conveyors are manufactured in several sizes and lengths to meet any desired requirements.

Methods of Analysis of Lime Offered by Association

The Research Department, National Lime Association, has prepared a manual of "Methods of Analysis of Limestone, Quicklime, and Hydrated Lime" divided into three sections as follows: Method of sampling and care of samples; Methods for routine analysis, and Methods for particularly refined and detailed analysis. This is intended primarily to be a convenient laboratory manual for use in the laboratories of the Association and of those manufacturers and consumers who have occasion to keep themselves informed of the chemical composition of their product or raw material.

Section I is a brief resume of the principles to be considered in sampling lump and pulverized materials, with a note on the particular problems presented in the sampling of lime. Section II contains the methods of laboratory procedure for the determination of those materials about which knowledge is more usually desired such as, Insoluble Matter, Iron and Aluminum, Calcium, Magnesium, Sulphate, and Carbon Dioxide. It also contains methods for "available lime," and for the determination of water. This latter, and that for carbon Dioxide, describe forms of apparatus developed in the Association laboratory which have been found to be particularly convenient.

Sections I and II are now available for distribution and may be obtained upon request to the National Lime Association. Section III, which covers methods for more detailed analyses, involving the separation of the oxides of the iron group, the determination of alkalies, Manganese, and elements less frequently determined, is in course of preparation.

E. S. Black Again with Amsco

Mr. E. E. Black has rejoined the American Manganese Steel Company, with his headquarters at Chicago Heights, Illinois. His duties are those of consulting engineer, both mechanical and sales. Mr. Black's long and extensive experience in the steel industry generally and his intimate contact with the manganese steel castings business in all its phases, over many years, peculiarly fit him for serving the users of manganese steel castings. Mr. A. H. Exton has also rejoined the Amsco organization, in the capacity of chief engineer.

Improved Arch Construction

A flexible arch tile enabling more economical and much easier arch construction and maintenance was displayed at the Chicago Power Show. The new Reintjes flexible arch tile, manufactured by George P. Reintjes Company, forms its own arch, requiring no temporary arch centers or skewbacks. Only two shapes of tile are needed regardless of the thickness of walls or the varying width of span, or whether the door jambs are square or bevelled.

Another feature of the tile is that no leveling is required. The units remain level with adjacent brickwork without any levelling medium. Each step up is equal to a brick course, the arch being built up in sections the width of one brick course. The tapered key of the tile facilitates repairs and replacement arches can be driven to a tight fit without disturbing overhead brickwork. The interior section of the arch can be repaired without interfering with the remaining sections.

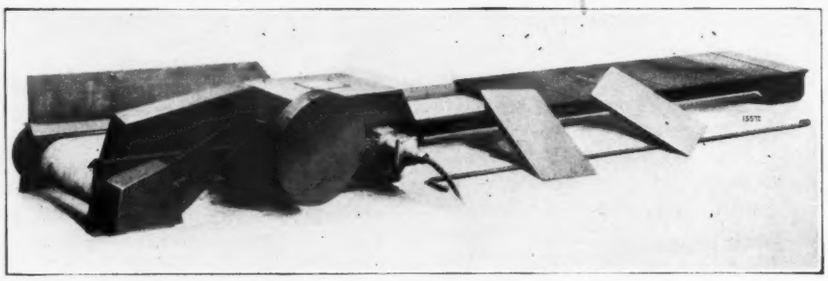
Cal, a Cement Admixture

Cal, manufactured by the North American Cement Corporation, is oxychloride of calcium and is a dry white powder. This material when used as an admixture to portland cement and mortar, has a combination of properties which facilitate and expedite new construction and repairs.

It is claimed that Cal accelerates the hardening of all portland cement concrete and mortar, bringing them to safe working strength in a fraction of the usual time. Just as it comes from the container this material is added at the mixer. It reduces the amount of water necessary in making concrete conveniently; it prevents the segregation of the aggregates, and makes a concrete mixture more easily workable and easier flowing. It prevents the too rapid drying out of concrete or stucco in very hot or dry weather, and thus minimizes the danger of surface cracks, checks, craizing and disintegration. The material is shipped in 100 pounds bags, all ready for use.

New Type Portable Unit Developed by Jeffrey

Unloading sand, gravel, crushed stone, coal, coke, etc., from hopper bottom cars without the use of a pit or trestle is the problem solved by a new Jeffrey portable unit, The X-Track Tor. This machine owes its success to a light compact design, made possible by the use of a specially protected belt instead of the usual heavy double strand of chain and scraper flights. The breakage of material is low when handled by this new unit.



The Jeffrey X-Track-Tor

The unit rests over the rails under the hopper of the car and only takes up a space of 2¾ inches between the bottom of the hopper and the top of the rail. The weight of the complete machine is a little over 600 lbs. but the motor and other parts are detachable leaving the heaviest pieces to handle about 450 lbs. In operation the flow of the material from the car is regulated by the hopper opening and by removable cover plates over the belt. No other regulation is necessary as it will work when completely buried in material and its capacity is governed only by the capacity of a secondary unit to which it delivers. As the material flows out of the car, the removable cover plates are removed permitting the machine to completely empty all the material from the farthest side of the car hopper. When unloading from a car, having several hoppers, the machine can be easily moved along the rails to the next hopper position or the car may be pinched along the track to accomplish the same purpose.

The X-Track-Tor is built with either a gasoline engine or an electric motor. The motor or engine is detachable for convenience in handling. The machine may be operated from the ordinary electric light current. The conveyor is 13 feet long and 20 inches wide over-all. A 16 inch 3 ply rubber covered belt is used. Maintenance costs are extremely low as there are few wearing parts and a very small amount of power is required to operate it.

The Buffalo Scales

The Buffalo Scale Company, Inc., manufactures a varied line of truck and track scales. For the protection of their highways, most states have a law which limits the wheel load of a truck. The regulations in New York state and practically all other states allow a load of 11,200 lbs. on each wheel. The shallow-pit bridge or A. R. E. A. bridge in the Buffalo Motor Truck Scale is built in tiers to stand far in excess of all usual stresses. The bridge design enables it to stand somewhat more than the 11,200 pounds allowed by the state laws, plus a further added margin for safety. The deep pit of the scale, provided by the deeper bridge makes the scale easy to inspect and clean.

On the track scales care must be taken so that they are not erected on a curve and there should be a car length of straight track at each end of the scale. Both the truck and track scales are manufactured in two types and of various capacities. The two types are known as the rigid bearing, type A, and suspension type B. On the former type the construction is where the bearings are attached to the platform guides. The bearings rest directly upon the main bearing pivots.

The pivots used on these scales are double tapered and fit snugly into tapered ways. A "slow taper" is used which has proven effective against the pivot working back in its seat. To insure exact gauge a continuous, even bearing throughout their length, these pivots, made from high carbon steel, are machined and honed to a knife edge of micrometer exactness. Every one is then tested for hardness with a diamond on a Rockwell Hardness Tester. These scales can be furnished with several types of recording beams such as single, compound or double beams.

Thew Shovel Appoints

The Thew Shovel Company announces the appointment of Mr. Paul Malenchini who will take full charge of its export department and be located at the general office of the company. Mr. Malenchini has had a wide experience in export affairs covering over 18 years. He has traveled extensively abroad, investigating markets, and has been especially active in Latin-American trade.

F. J. Donnelly Joins Botfield

Frank J. Donnelly has joined the New York office of the Botfield Refractories Company and will cover the New Jersey territory under the direction of Charles C. Phillips, New York district manager.

"Jak-Tung" Trucks

The small, three-wheeled truck, manufactured by the Howe Chain Company, and used for either hauling or storage is now known under the trade name of "Jak-Tung." This truck consists of a platform, equipped with two malleable iron wheels at the rear, and a malleable iron draw bar in the front. The jack tongue, from whence the truck takes its name, with wheel, hooks into the draw bar leg, and, by a downward thrust of the handle, the load is raised, and may be hauled anywhere.

The trucks are built in 17 different sizes and 3 models, with either steel or hardwood platforms or trays, and in varied combinations. This truck finds its greatest usefulness as a material conveyor in plants, handling loose, bulk, package, or heavy piece equipment up to 3 tons in weight. Features claimed for the truck are that, since materials are kept on wheels from one operation to the next, congestion and spoilage, in addition to the expense of double handling, are obviated. It is declared that trains of eight or ten of these trucks, together with a tractor, will wind around machines, turn sharp corners, negotiate narrow pathways, and in other ways function efficiently and track perfectly in congested quarters.

Fairbanks Morse Takes Over Fairbanks Scale

Fairbanks, Morse & Company has taken over the scale business of The Fairbanks Company, it was officially announced in the Company's office recently. In 1916 Fairbanks-Morse purchased E. & T. Fairbanks and Company, with its scale factories at St. Johnsbury, Vermont, and East Moline, Illinois. The Fairbanks Company of New York, however, held the distributing rights for Fairbanks scales in the Eastern and Southern portions of the United States and abroad. The present transaction, therefore, gives Fairbanks-Morse complete control of the manufacturing and distribution of Fairbanks scales. A scale manufacturing plant at Birmingham, England, as well as the London sales agency and all other sales agencies throughout the world, are included in the deal.

The history of Fairbanks scales, which began with the invention of the platform scale by Thaddeus Fairbanks of St. Johnsbury, Vermont, in 1830, is one of the interesting developments in American business. Previous to the invention of the platform scale, all weighing had been done with the old-fashioned steelyard. From this primitive contrivance, the platform scale, in many styles and sizes has been developed into a useful part of the equipment of almost every business, making possible the weighing of extremely small objects up to those weighing hundreds of thousands of pounds.

As a result of this early development, E. & T. Fairbanks and Company was organized. In 1858 they sent Mr. Greenleaf and C. H. Morse to Chicago to establish an agency under the name of Fairbanks & Greenleaf, for the distribution of Fairbanks Scales in the Western territory. In 1871 the name of the firm was changed to Fairbanks, Morse & Company, when C. H. Morse took charge of the business. As the company grew, it acquired manufacturing plants at Beloit, Wisconsin, Indianapolis, Indiana, and Three Rivers, Michigan. It is well known as a large manufacturer of Diesel engines, Electric motors, pumping equipment, home light and water outfits, windmills, coaling stations, railroad standpipes, etc. The Fairbanks Company of New York will continue to manufacture valves and sundry other products at Binghampton, New York, and wheelbarrows and industrial trucks at Rome, Georgia.

New Lidgewood Hoist

The Lidgewood Manufacturing Company has added to its standard line an 8 horse power gasoline hoist. This hoist is a single drum self contained unit, having front of bedplate planed off to receive a second drum, which can be added in the field.

It is a strong, little hoist, easy to operate and easy to move. It replaces hand power for light derrick work, concrete and building material elevators on low buildings, setting stone, loading and unloading lighters and barges, mast and gaff rigs, etc. Cost of operation is so low, and the saving in labor so great, that it is a profit maker on the smallest and largest jobs.

Screening for Profit

The W. S. Tyler Company has recently issued Catalog 52, under the above title describing the design and application of the Hummer Screen. This book states that more than 200 different kinds of material, ranging from the coarsest to the finest, are being screened profitably by the Hummer screen. Wet materials, such as sand and gravel pumped from a river bed; hot materials such as calcined gypsum direct from kettles or calciners; damp and sticky materials such as clay; and flaky products such as mica and graphite; all come within the range of materials being screened by the Hummer.

The method of vibrating the screen cloth at drumhead tension spreads the material uniformly over the entire screening surface, assuring an even, gradual wear of the cloth. The Hummer mechanism will vibrate one, two or three surfaces, the surfaces being bolted rigidly to the armature part by means of brackets, and are vibrated simultaneously. When the character of material and other conditions are such that two surfaces can be used to advantage, economy can be gained in equipment, power, floor space and head room. The three surface Hummer is recommended only for very free screening materials. The electric vibrator used on these screens is a simple, positive and effective means for vibrating the wire cloth screening surface. The vibrator is directly above the screening surface and free from contact with the material being screened; it is enclosed in a metal dustproof housing and is readily accesible to the operator.

The vibrator consists of a magnet and armature. The alternations of the current alternately pull up and release the armature at high speed. The vibrators are operated with 15 cycle current generators. Each vibrator is brought to a sudden stop by the striking plates, thus developing a sharp jar which is effective in putting the material through the screen cloth. The intensity of the vibration can be regulated, by means of a hand wheel, to suit the conditions of the material. The Hummer does not require lubrication so that there is no danger of oil or grease being diluted by water or moiture getting into the virbrator.

The wire cloth used on the screens has reinforced edges which hold each wire firmly in place. The method of changing the screen cloth is simple. It is only necessary to lay the cloth on the frame and turn the stretcher bars until the hook strips are engaged and the desired tension of the cloth is produced. The screens are provided with a simple and easy means of adjusting the screening angle. On type 31 and 33 the angle is changed by means of a threaded bolt and nut at the back of the machine; on type 37 and 39 the angle is changed by turning the nuts on a threaded shaft at both sides of the lower end of the Hummer.

The book is very complete, containing many line drawings and illustrations of installations, dimension drawings and clearances, method of determining screening angles and other data of value and interest to the users of screens.

Hovey Heads Fairbanks Morse

At the annual meeting recently of the directors of Fairbanks, Morse & Company, W. S. Hovey was elected president, the former president, C. H. Morse, becoming chairman of the Board. This is the first time this position has been held by a man not of the original Morse family.

W. S. Hovey

Born in 1875, a graduate of Cornell, Mr. Hovey joined the Sheffield Car Company, an affiliation of Fairbanks-Morse, in 1902, as assistant superintendent. Later he became superintendent, which position he held until 1913, when he was transferred to the Beloit Works of Fairbanks-Morse as manager of the engine division. A few months later, saw him general manager of that plant.

In 1919, Hovey was elected vice president in charge of all the manufacturing activities of Fairbanks-Morse and in 1924, was made general manager of the entire business. His elevation to the presidency brings a man to the helm of this company who has worked his way up through the ranks. His thorough grasp of all factors of this widely extended business makes him, in the opinion of his associates, well suited for the new office. He will remain general manager.

New Hercules Films

The Hercules Powder Company has recently added two new films to its library of industrial education films. The first is entitled "The Explosives Engineer—Forerunner of Progress." This two reel film describes this company's experimental station and the testing station of the U. S. Bureau of Mines at Bruceton, Pennsylvania and graphically shows how explosives are tested by both the manufacturer and the government. The second part portrays the explosives engineer on the job and the scientific application of explosives to all classes of mining and construction work.

"Hercules Electric Blasting Caps," the other new film was taken at the Hercules Powder Company's Port Ewen cap works in New York state. This is the first film to attempt to unravel the mystery that surrounds the manufacture and construction of an electric blasting cap. By the use of animated diagrams a clear idea is given of the delicate bridge, the sealing compound, the method of relieving stress on the bridge and how a uniform charge of fulminate of mercury is loaded in the shell. The correct method of priming a dynamite cartridge is also illustrated.

These films will be loaned, without charge, and sent postpaid to any one desiring to exhibit them, in either the 16 m/m or 35 m/m width prints, upon application to the Hercules Powder Company, Wilmington, Delaware.

R. H. Beaumont Buys American Manufacturing Co.

R. H. Beaumont Company announce they have taken over the business of the American Manufacturing and Engineering Company and products formerly manufactured by this company, including the American slack line cableway excavator, will now be manufactured by the R. H. Beaumont Company. Mr. S. O. Nafziger, president of the American Manufacturing and Engineering Company will be associated with R. H. Beaumont Company.

The addition of the American slack line cableway excavator to the Beaumont line which already includes the Beaumont LeClair cable drag scraper, completes a full line of equipment for the excavating, elevating, storing of sand, gravel, stone and kindred materials. The R. H. Beaumont Company will sell the complete system for this service, including the hoist.

Fifty Years in Wire Cloth Record of J. C. Campbell

On April 2, 1927 John C. Campbell, president of the Newark Wire Cloth Company completed his 50th consecutive year as manufacturer of wire cloth. Approximately 16 of these 50 years have been with his present company and about 8 years were with his former company. The rest of the time was devoted to his trade.

Like many other industries of today, the Newark Wire Cloth Company, when organized by Mr. Campbell, was small. When his first factory was ready to operate it consisted of only 3 old-fashioned hand looms. These looms presently gave way to new and improved automatic machinery, and today the Newark Wire Cloth Company is a well equipped plant. Their facilities enable them to manufacture with the most exacting accuracy in wire diameter, weave, and spacing, wire cloth of all sizes ranging from a 4-inch opening of heavy wire to the finest wire cloth woven. All of the fine wire used in weaving the wire cloth is drawn in their own plant.

Of course, growth through the succeeding years made necessary the construction of additions to the original plant. In 1923 their plant occupied seven buildings. During that year they purchased the Morse & Whyte Company of Cambridge, Mass., an old-established wire cloth manufacturer and at the same time erected a large new building of sufficient floor space to house under one roof the entire equipment of the two former plants.

One reason for Mr. Campbell's success is his alertness to appreciate the value of new developments. Under his skilful guidance the spiral weave "Newark" metallic filter cloth was developed. His company was the first in the world to appreciate the value of and adopt the new U. S. Bureau of Standards specifications for testing sieves. The latest development of his company is a gasketed metallic filter cloth which is proving satisfactory in service.

New Novo Distributors

The following new distributors have been recently appointed by the Novo Engine Company: The Construction Equipment Company, Columbia, South Carolina, who will handle the complete line of Novo industrial equipment—engines, hoists, pumps and combination outfits, in the State of South Carolina. The San Antonio Machine & Supply Company, San Antonio, Texas, with branches at Corpus Christi and Waco, Texas, will serve the south central part of Texas. The H. E. Erickson Company, Inc., 114 South Third Street, Minneapolis, Minnesota, will cover the north central territory.

Clyde Iron Works Moves Jacksonville Office

The Clyde Iron Works Sales Company announces the removal of its Jacksonville office from the Bishes Building to the Barnett National Bank Building. Mr. E. J. Nelson is local manager.

Magnesium Salts in 1926

The production of magnesium salts from natural sources in 1926 in the United States was 76,560,000 pounds, valued at $1,040,800, according to James M. Hill, of the Bureau of Mines, Department of Commerce. This is a decrease of 10 per cent in quantity and 17 per cent in value as compared with the production in 1925. Four companies produced 52,569,000 pounds of magnesium chloride, valued at $701,580, from bitterns. Of this quantity 45,630,000 pounds was solid chloride, which sold at $0.0148 a pound, and 6,939,000 pounds was in liquid form from 23 to 36 degrees Baume, which sold at $0.0039 a pound.

Three companies produced magnesium sulphate to the amount of 23,991,000 pounds, which sold for $0.0141 a pound. Ninety-seven per cent of the sulphate was made from salt works bitterns and the balance from natural magnesium sulphate. Imports of magnesium compounds in 1926 were 29,997,410 pounds, valued at $293,079, an increase of over 5,500,000 pounds as compared with 1925. Exports of magnesia and manufactures in 1926 totaled 6,579,221 pounds, valued at $323,386, an increase of over 1,300,000 pounds as compared with 1925.

New Link-Belt Grease Cups

The Link-Belt Company announces an interesting product to all manufacturers whose processes or fabrication require the use of grease cups. This consists of the new Hex-Top malleable iron compression grease cup with Alemite, or Zerk fittings. The trade name "Tex-Top" describes very aptly the shape of the grease cup head. Six-sided, it offers, for turning, an easy purchase for any type of wrench, and a good grip for the hand.

The combination of compression grease cup and Alemite fitting is a distinct improvement over either article used separately. An example of this would be in the lubricating system of a long belt conveyor using many grease cups for the idlers: here the easiest, quickest, and most economical way to fill all the cups at one time, it is said, is with a grease gun applied to the Alemite fitting, when the cup is turned up to a high point, but not entirely unscrewed or removed. The filling can be done without waste of grease, and without any inconvenience; the cup holds a good reserve for use of the compression feature; and an occasional slight screwing down by hand or wrench is all that is necessary until it is time to have a general refilling of the cups.

Fluorspar Industry in 1926

As was to be expected in a year in which there was a record production of steel, the fluorspar industry did a larger volume of business in 1926 than in 1925, according to a statement prepared by Hubert W. Davis, of the United States Bureau of Mines, Department of Commerce. The increase of 13 per cent in shipments made by domestic producers, however, did not keep pace with the imports of fluorspar, which increased 55 per cent over 1925 and are the largest on record.

Shipments

The fluorspar shipped from mines in the United States in 1926 amounted to 128,657 short tons and was valued at $2,341,277, as compared with 113,669 tons, valued at $2,052,342, in 1925. Thus there was an increase of 13 per cent in quantity and 14 per cent in total value as compared with 1925. Illinois, Colorado, and New Mexico each shipped less fluorspar than in 1925, but Kentucky not only shipped the second largest quantity ever recorded for that state but for the second time since 1904 the shipments exceeded those of Illinois.

The reported shipments of fluorspar to manufacturers of steel, glass, and enamel and sanitary ware were more than in 1925 and the quantity exported was twice as much as in the preceding year, but there were decreases in the reported shipments to foundries and to manufacturers of hydrofluoric acid. The general average value per ton f. o. b. shipping points for all grades of fluorspar in 1926 was $18.20, which is only slightly higher than the average for 1925, which was $18.06. The following tables show the details of the shipments of fluorspar by states, by kinds, and by uses for 1925 and 1926.

Stocks at Mines

According to the reports of producers the stocks of fluorspar at mines or at shipping points on December 31, 1926, amounted to 17,912 short tons of gravel fluorspar, 1,987 tons of lump fluorspar, and 832 tons of ground fluorspar, a total of 20,731 tons of "ready-to-ship" fluorspar. In addition there was in stockpiles at mines at the close of 1926 about 48,000 short tons of crude (run-of-mine) fluorspar which must be milled before it can be marketed and which is calculated to be equivalent to about 28,000 tons of merchantable fluorspar. These stocks compare with 22,551 tons of "ready-to-ship" fluorspar and 44,335 tons of crude fluorspar on December 31, 1925. Thus the stocks of merchantable fluorspar were slightly decreased but the stocks of crude fluorspar were increased somewhat.

Imports

Noteworthy features of the imports of fluorspar in 1926 are the importation from Spain, a new source, the increase of 340 per cent in the imports from France, the resumption of imports from Canada, and the decrease of 68 per cent in the imports from Italy. The United Kingdom, as usual, was the chief source of the imports, supplying about 39 per cent of the total in 1926. The greater part of the fluorspar from the United Kingdom was sold for use in steel plants and foundries. Germany furnished 27 per cent of the total fluorspar imports in 1926, which was 75 per cent more than in 1925. The

Fluorspar shipped from mines in the United States, 1925-1926, by states.

State	1925 Short tons	1925 Value Total	1925 Value Average	1926 Short tons	1926 Value Total	1926 Value Average
Illinois	54,428	$1,024,516	$18.82	53,734	$1,012,879	$18.85
Kentucky	44,826	833,794	18.60	62,494	1,167,129	18.68
Colorado	11,776	153,707	13.05			
New Mexico	2,639	40,325	15.28			
				12,429	161,269	12.98
	113,669	$2,052,342	$18.06	128,657	$2,341,277	$18.20

Fluorspar shipped from mines in the United States, 1925-1926, by kinds.

Kind	1925 Short tons	1925 Value Total	1925 Value Average	1926 Short tons	1926 Value Total	1926 Value Average
Gravel	97,395	$1,611,283	$16.54	112,092	$1,868,854	$16.67
Lump	6,697	132,178	19.74	5,292	108,710	20.54
Ground	9,577	308,881	32.25	11,273	363,713	32.26
	113,669	$2,052,342	$18.06	128,657	$2,341,277	$18.20

Fluorspar shipped from mines in the United States, 1925-1926, by uses.

Use	1925 Short tons	1925 Value Total	1925 Value Average	1926 Short tons	1926 Value Total	1926 Value Average
Steel	91,760	$1,482,461	$16.16	105,614	$1,744,085	$16.51
Foundry	6,275	121,177	19.31	6,212	121,453	19.55
Glass	6,767	211,331	31.23	7,507	240,288	32.01
Enamel and sanitary ware	3,237	101,060	31.22	3,410	113,445	33.27
Hydrofluoric acid	4,455	114,059	25.60	3,410	79,105	23.20
Miscellaneous	120	4,680	39.00	372	7,986	21.47
Exported	1,055	17,574	16.66	2,132	34,915	16.38
	113,669	$2,052,342	$18.06	128,657	$2,341,277	$18.20

United Kingdom and Germany together contributed about 66 per cent of the total imports in 1926. Most of the fluorspar received from Germany in 1926 was sold for use in the iron and steel industry, but some was sold to manufacturers of ceramics and hydrofluoric acid.

The total imports of fluorspar into the United States in 1926, amounting to 75,671 short tons, represent an increase of 55 per cent over 1925 and are the largest ever recorded. The imports in 1926 are equivalent to 59 4405 Pit & Quarry 4-6 Madigan per cent of the total domestic shipments of fluorspar, as compared with 43 per cent in 1925.

The following table shows the imports of fluorspar into the United States by countries for 1925 and 1926:

Fluorspar imported into the United States, 1925-26, by countries, in short tons 1*

(General imports)

Country	1925	1926
Africa:		
British South	7,906	7,534
British West		610
Portuguese East		362
Belgium	78	31
Canada		1,109
China	559	645
Czechoslovakia	27	
France	2,537	11,163
Germany	11,680	20,465
Italy	4,278	1,379
Soviet Russia in Asia		18
Spain		2,948
United Kingdom	21,635	29,407
	48,700	75,671

1* Figures compiled from records of the Bureau of Foreign and Domestic Commerce and those for 1926 subject to revision.

consumption and stocks of most of the chief consumers are included in the table.

The data furnished by manufacturers of steel by the basic open-hearth process show that they consumed 140,449 short tons of fluorspar in 1926 and had stocks on hand amounting to 69,369 short tons on December 31, 1926. When the consumption and stocks of all companies are included it is believed the total consumption by basic open-hearth steel companies will be in the neighborhood of 142,000 short tons and the stocks will total about 70,000 short tons. These stocks are the largest recorded since such statistics have been collected by the United States Bureau of Mines. The general average consumption of flourspar per ton of basic open-hearth steel made showed a decrease for the third consecutive year, amounting to 7.2 pounds in 1926, as compared with 7.4 pounds in 1925, 7.8 pounds in 1924, and 8.1 pounds in 1923.

Alloy-steel manufacturers are the chief users of fluorspar in making steel by the electric-furnace process, the companies from which reports were received showing a consumption of 4,177 short tons of fluorspar in 1926 and stocks on hand on December 31, 1926, amounting to 1,853 short tons. Making allowance for the consumption by the companies not reporting, the total would probably not exceed 5,000 short tons. The general average consumption of fluorspar per tons of electric-furnace steel made by the plants using fluorspar was 23 pounds in 1926.

Fluorspar reported consumed and in stock in the United States in 1926, by industries

Industry	Companies reporting	(Short tons) Fluorspar consumed	(Short tons) Stocks at consumers' plants December 31
Basic open-hearth steel	72	140,449	69,369
Electric-furnace steel	54	4,177	1,853
Foundry	60	3,924	1,377
Ferroalloys	4	248	80
Hydrofluoric acid	5	7,591	12,153
Enamel and sanitary ware	69	6,671	935
Glass	42	7,954	1,335
Miscellaneous	14	719	252
	..	171,733	87,354

The figures on consumption of fluorspar in 1926 and stocks at consumers' plants on December 31, 1926, given in the above table, while not including data from all consumers, are believed to fall not far short of the total for the United States. Thus, the figures on consumption and stocks represent plants that make about 99 per cent of the total basic open-hearth steel and about 90 per cent of the total electric-furnace steel made in the United States. The proportional representation of users of fluorspar in the other industries listed is not known precisely, but reports on

Du Pont Products Exhibit Draws Large Interest

During the last two years, according to reports, 449,258 visitors called at the Du Pont Products Exhibit on the Boardwalk at Atlantic City to view the various articles on show there made from Du Pont raw materials. These included nearly 200 different lines, and consisted of hundreds of articles made in whole or part of Fabrikoid, Pyralin, chemical products, rubber products, rayon, dyestuffs, Cellophane, Duco, paints and varnishes.

Special exhibits were made during the past year of the newer products recently put into manufacture by the company. The Du Pont Company being a chemical manufacturing organization has followed the policy of maintaining large chemical research organizations, this being regarded as essential to the maintenance of the company's position in its field and its growth with the development of the art. As a result of this policy there have been developed recently such products as "oval powder," an improved sporting powder; Duco, a new finish for automobiles, furniture, and other lines, "Brush Duco," a fast drying enamel for general household application; new types of Fabrikoid; nitroglycerin dynamite, which will not freeze; better types of chemicals used in vulcanizing rubber; chemical disinfectants for cereals and root crops which substantially increase their yield and quality, and many other processes and products. One of these products, "Semesan," a seed disinfectant, has been tested out by the Department of Agriculture and in a special bulletin the department has announced that through its use, they have been able to control crown gall or "tree cancer" in root grafted apple nursery business.

Sprague Hoist Business Taken Over by Shepard

The entire Sprague portable hoist business of the General Electric Company has been taken over by the Shepard Electric Cranes and Hoist Company, according to a recent General Electric announcement. The change took place April 1st.

Sprague hoists have been built in the Bloomfield plant of the General Electric Company since 1903. The Shepard Company will continue the manufacture of this line and has established for this purpose a division known as the Sprague Hoist Division of the Shepard Electric Crane and Hoist Company, with offices at 30 Church Street, New York City. N. A. Hall, of the General Electric Company, will take charge of the new Shepard division, after 14 years of service with General Electric.

The Shepard Company will furnish spare parts for obsolete types of Sprague hoists as well as for the current line. The General Electric Company will continue to manufacture the parts for motors which have been used on Sprague hoists, and parts for controllers and brakes, but this business will be handled commercially by the Shepard Company.

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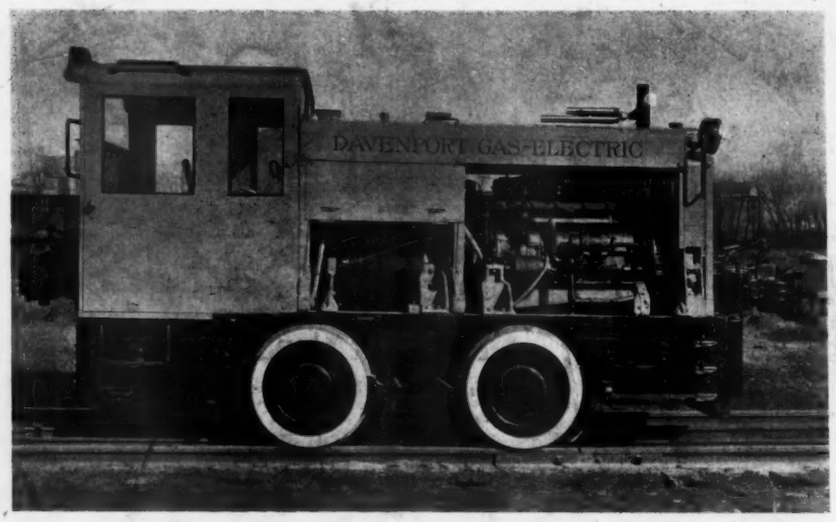

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The illustration shows the simplicity of construction. The gasoline engine is directly connected to the Electric Generator—Electric current is built up as needed—Electric motors to each axle—Each wheel a driver.

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